Fertility and its proximate determinants in Mozambique:

An analysis of levels, trends, differentials and regional variation

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DECLARATION

Except where otherwise stated, this thesis is my own research work carried out from February 2000 to February 2003 as a PhD Scholar in Demography at the Australian National University.

Carlos Arnaldo

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Dedication

In memory of my sister, Angelina Arnaldo, who passed away during the course of this research.

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ABSTRACT

Despite increasing demographic research on sub-Saharan Africa in the last decades, fertility behaviour in Mozambique has remained poorly documented. This research examines fertility levels, trends and differentials in Mozambique by region and province. Each of the main proximate determinants of fertility (nuptiality, postpartum infecundability, infertility and contraception) is separately examined and the effects of socio-economic and cultural factors are assessed using bivariate and multivariate approaches. The study uses data from the 1980 and 1997 censuses, the 1997 Demographic and Health Survey and qualitative data collected through focus group discussions, in-depth interviews, informal conversations and participant observation.

Indirect estimation of fertility levels shows an apparent decline of fertility from 7 children per woman in 1980 to 6 children per woman in 1997; but a more rigorous examination, using more robust methods, suggests no clear evidence of a change towards lower fertility at the national level. However, the study shows substantial regional differences, with fertility decline being well established since the early 1980s in the most prosperous Southern Region, while it has barely started in Northern and Central Regions.

The analysis of regional and provincial differences in fertility identifies uneven socio-economic development as the main explanatory factor. The multivariate analysis suggests that for total fertility, the differentials are mainly explained by socio-economic development factors (education, urban-rural residence and employment status), while for the individual proximate determinants, ethnicity also has an important effect, particularly in explaining the differentials in nuptiality patterns, the level of pathological infertility and the duration of postpartum infecundability. The decomposition of the total fertility rate into its main proximate determinants shows that postpartum infecundability has the strongest fertility-reducing effect while contraceptive use has the weakest.

The study also considers the possibility of a slow decline of fertility at the national level and in Central and Northern Regions in the near future, with regional differences in fertility likely to increase owing to a faster fertility decline in the Southern Region where fertility decline is already under way. Some policy implications are also discussed.

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LIST OF ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
ANU	the Australian National University
CCR	Conselho Coordenador do Recenseamento (Census Co-ordinating Council)
CEB	Children ever born
CEP	Centro de Estudos de População (Population Studies Centre)
DHS	Demographic and Health Survey
FGDs	Focus group discussions
FRELIMO	Frente de Libertação de Moçambique (Front for the Liberation of Mozambique)
HIV	Human Immunodeficiency Virus
IDIs	In-depth Interviews
IDN	Inquérito Demográfico Nacional (National Demographic Survey)
INE	Instituto Nacional de Estatística (National Institute of Statistics)
IUSSP	International Union for the Scientific Study of Population
MCH	Mother and Child Health
PSI	Population Services International
RENAMO	Resistência National Moçambicana (Mozambican National Resitance)
RGM	Relational Gompertz Model
STDs	Sexually Transmitted Diseases
UNAIDS	Joint United Nations Program on HIV/AIDS
UNFPA	United Nations Population Fund
UNICEF	United Nations Children Fund
WHO	World Health Organization
UN	United Nations
WFS	World Fertility Survey

Chapter 1

INTRODUCTION

1.1 Introduction

Total fertility rates in sub-Saharan Africa[1] are the highest in the world and their decline has been slow or non-existent. The region is culturally and economically diverse and comprehensive studies of fertility are still lacking in some countries, in particular African Lusophone (Portuguese-speaking) countries.

Mozambique is largely absent from the vast majority of socio-demographic literature on sub-Saharan Africa. The lack of fertility studies (and demographic studies in general) in Mozambique is partly due to the country's long history of war: the 10-year (1964-1974) liberation war and the 16-year (1976-1992) civil war opposing the post-independence socialist government of the ruling FRELIMO (Front for the Liberation of Mozambique) party against the RENAMO (National Resistance Movement) that followed immediately after Independence. This destroyed the already weak economy, affected the social structure of the population and inhibited the normal process of reliable demographic data collection.

This thesis, therefore, aims to analyse fertility behaviour in contemporary Mozambique. Fertility is broken into its main proximate determinants (nuptiality, postpartum infecundability, infertility and contraception) and the effects of socio-economic and cultural factors on each proximate determinant are assessed using bivariate and multivariate approaches. The study uses the 1980 and 1997 Censuses, the 1997 Demographic and Health Survey (DHS) and qualitative data collected by the author in Southern Region, and offers important evidence about fertility behaviour that is relevant to the implementation of the 1999 National Population Policy aimed at achieving economically sustainable population growth (Republic of Mozambique 1999).

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[1] 'Sub-Saharan Africa' and 'Africa' are used interchangeably to refer to Africa south of the Sahara Desert.

1.2 Overview of fertility in sub-Saharan Africa

1.2.1 Fertility levels and trends

Fertility rates in sub-Saharan Africa are the highest in the world, and it is the only major region of the world that has not yet undergone a general decline in fertility (Cohen 1998; Caldwell and Caldwell 2001). The Total Fertility Rate (TFR) of the majority of the countries remained above five children per woman in the 1990s. For example, of the 41 countries covered by Cohen (1998) in his analysis of fertility in sub-Saharan Africa, 22 had TFRs of 6.0 or above, 17 had TFRs between 5.0 and 6.0, and only two (South Africa and Zimbabwe) had a TFR below 5.0 (Cohen 1998:Table A1). However, there is increasing evidence that fertility decline has started in many countries of the region (Caldwell, Orubuloye and Caldwell 1992; Caldwell and Caldwell 1993; Cohen 1993, 1998; Blacker 1994; Blanc and Rutstein 1994; Cleland, Onuoha and Timæus 1994; Mturi and Hinde 1994; Thomas and Muvandi 1994b, a; Kalipeni 1995; Kirk and Pillet 1998; Hinde and Mturi 2000; Muhwava 2002). Such evidence led Gould and Brown (1996:4,6) to suggest that the important research questions should now be about the magnitude and sustainability of the decline, rather than its initiation. Cohen (1993) identified a fall in TFR for 26 of the 38 countries within the region since their peak fertility levels of the 1970s and early 1980s. In a later analysis, Cohen (1998) found that fertility was falling in 22 of the 41 countries included in the study, but in most cases the declines were quite small, less than one child per woman. Only in 10 countries did fertility decline by 1.5 children per woman or more. Kirk and Pillet (1998) came to the same conclusion.

The evidence of declines in fertility is stronger in East and Southern Africa than in West Africa. However, even in West Africa fertility decline has been reported in Ghana, Côte d'Ivoire and Senegal (Kirk and Pillet 1998). In Ghana the TFR declined from 6.4 children per woman in 1988 to 4.6 children per woman in 1998 (Parr 2002:85); in Côte d'Ivoire from 7.2 in 1980 to 5.2 in 1998 (Côte d'Ivoire Institut de la Statistique and ORC Macro 2001:37); and in Senegal from 7.1 in 1978 to 5.7 in 1997 (Ndiaye, Ayed and Gaye 1997:25). The fertility decline in Ghana is mainly attributed to an increasing age at marriage and contraceptive use (Mba 2002; Parr 2002), while in Côte d'Ivoire and Senegal, the declines in fertility are strongly associated with increasing age at first marriage (Pison et al. 1995; Côte d'Ivoire Institut de la Statistique and ORC Macro 2001). Contraceptive use in these two countries remains low at 8.1 per cent in Senegal in 1997 (Ndiaye et al. 1997:43) and 7.3 per cent in Côte d'Ivoire in 1999 (Côte d'Ivoire Institut de la Statistique and ORC Macro 2001:55) of married women using modern contraception.

In East Africa, Kenya has experienced the most substantial decline. A multiple surveys analysis by Brass and Jolly (1993) found that the declines in fertility have been occurring in almost all socio-economic and demographic groups. Most of the decline could be attributed to an increase in the use of efficient contraceptive methods, particularly at young ages, and to increases in the age at first marriage (Sibanda 1999). Similarly, a rise in contraceptive use and in age at marriage were also associated with fertility decline in Tanzania (Hinde and Mturi 2000). Hinde and Mturi's (2000) comprehensive analysis of Tanzania's censuses and birth history data concluded that fertility had been declining probably since the late 1970s, and its pattern was consistent with that observed in other sub-Saharan African countries, such as Kenya.

In Southern Africa[2], where Mozambique is geographically located, fertility levels in the late 1990s varied substantially from country to country, ranging from 3.1 children per woman in South Africa to 6.9 children per woman in Angola (see Table 1.1). As Table 1.1 suggests, there is a high correlation between TFR and the contraceptive prevalence rate (Pearson $r = -0.83$, $p<0.01$). The countries in the southernmost part of the region have lower TFRs and higher contraceptive prevalence rates than the remaining countries. The current TFRs in South Africa, Zimbabwe and Botswana, of between 3.1 and 4.2 children per woman, represent a decline of 40-50 per cent from their peak level (Potts and Marks 2001:189). In Zimbabwe the TFR declined from around 6.0-7.0 during the early 1980s to 4.0 in 1999 (Zimbabwe Central Statistical Office and Macro International 2000:40; Potts and Marks 2001:191; Muhwava 2002:5). Much of Zimbabwe's success in lowering the TFR has been attributed to high levels of education, relatively low levels of infant and child mortality, and a well-designed and well-managed family planning program (Thomas and Maluccio 1996; Guilkey and Jayne 1997; Hindin 2000). Modern contraceptive prevalence among married women aged 15-49 increased from 27 per cent in 1988 to 42 per cent in 1994 (Edwards 1996:47) and 50 per cent in 1999 (see Table 1.1), making Zimbabwe the country with the second (after South Africa) highest contraceptive prevalence rate in sub-Saharan Africa.

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[2] Southern Africa in this thesis includes the following countries: Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Zambia and Zimbabwe.

Table 1.1 Total fertility rates and contraceptive prevalence rates among married women in Southern African countries, 1996-2000

Countries	Year	TFR	CPR	Source
Angola	1996	6.9	4.2	Agadjanian and Prata (2001:339, 343)
Botswana	1996	4.2	32.0	Potts and Marks (2001:Table 1)
Lesotho	1996	4.1	23.0	Potts and Marks (2001:Table 1)
Malawi	2000	6.3	26.1	Malawi National Statistical Office and SRC Macro (2001:40, 55)
Mozambique	**1997**	**6.1**	**5.1**	For TFR see Table 3.6 in Chapter 3; CPR from 1997 DHS
Namibia	1998	4.8	29.0	Potts and Marks (2001:Table 1)
South Africa*	1998	3.1	57.6	South Africa Department of Health (1999:19, 21)
Swaziland	1997	4.9	17.0	Potts and Marks (2001:Table 1)
Zambia	1996	6.1	14.4	Zambia Central Statistical Office (1997:33, 49)
Zimbabwe	1999	4.0	50.4	Zimbabwe Central Statistical Office and Macro International (2000:40, 55)

*Black population only.

South African fertility has been declining for almost 30 years and is currently the lowest in the region (Moultrie and Timæus 2002). Indeed, the black population of South Africa experienced a decline in fertility before any other country in the region but it remained poorly documented until the early 1990s because of the long period of international political isolation due to apartheid and the government reluctance to provide open access to demographic data (Caldwell and Caldwell 1993; Moultrie and Timæus 2002). The TFR of the black population began to fall in the mid-1960s from a level of about 7.0 children per woman and has followed a gradual trajectory, attaining a TFR of 4.6 by the early 1980s (Caldwell and Caldwell 1993:231-242) and 3.1 in 1998 (South Africa Department of Health 1999:19). The driving force for such a decline was the strength of its family planning program (Chimere-Dan 1996; Kaufman 1998, 2000). By 1988, 44 per cent of all black South African women aged 15-49 were using modern contraception (Kaufman 1998:427); this increased to 58 per cent in 1998 (South Africa Department of Health 1999:21).

In Botswana, on the other hand, fertility decline in both urban and rural areas started in the early 1980s from a level of 7.1 in 1981, falling to 5.0 in 1988 and then to 4.2 in 1996 (Rutenberg and Diamond 1993; Blanc and Rutstein 1994; Thomas and Muvandi 1994b; Potts and Marks 2001). It is believed that the steep decline in fertility observed during the 1980s resulted from increasing age at marriage and contraceptive use mainly due to general socio-economic development and modernisation which was accompanied by rapid urbanisation and growth in educational attainment (Rutenberg and Diamond 1993; Thomas and Muvandi 1994b). The decline in rural areas was also a response to the extremely harsh conditions created by the drought, which made rural dwellers less able to enter or sustain stable unions and more open to the increased activities of the family planning program (Rutenberg and Diamond 1993:154).

Fertility decline has also been reported for all the remaining countries in Table 1.1, except Angola. In Lesotho, Namibia and Swaziland the TFR has fallen by up to 30 per cent in about two decades (Potts and Marks 2001). Mozambique is in a group of three countries (Malawi, Mozambique and Zambia) where the declines have been modest and fertility rates are still around 6.0 children per woman with the percentage of married women currently using modern contraception in the late 1990s being less than 15 per cent in Mozambique and Zambia and around 26 per cent in Malawi. It is unclear why, despite having the highest contraceptive prevalence rate among these three countries, Malawi has the highest TFR. The three countries exhibit similar marriage patterns, with the median age at first marriage being around 18 years, but Malawi has the shortest postpartum abstinence period: the median is equal 5.8 months against 8.3 months in Zambia and 12.0 months in Mozambique (Zambia Central Statistical Office 1997; Gaspar et al. 1998; Malawi National Statistical Office and SRC Macro 2001).

There is no sign of fertility decline in Angola. The analysis by Agadjanian and Prata (2001) concluded that Angola was still a pre-transitional society characterised by an early beginning of childbearing and low contraceptive use, 4.2 per cent in 1996. They reported, however, the possibility of some fertility decline and shift of childbearing to older ages, but they were doubtful whether those changes were real and reliable given the very limited data on which they were based (Agadjanian and Prata 2001:190).

1.2.2 The determinants of fertility

During the last two decades the prospects of fertility decline in sub-Saharan Africa and the extent to which the region is different from other developing countries of Asia and Latin America, where fertility transition has been under way, has caught the attention of the demographers. The demographic debate about the factors behind the observed fertility levels in the region has been dominated by two competing views: socio-cultural factors and low economic development (National Research Council 1993a). According to the 'socio-cultural' view (Caldwell 1982, 1996; Caldwell and Caldwell 1987, 1990b, a; Acsadi and Johnson-Acsadi 1990b; Caldwell et al. 1992; Sonko 1994), high fertility in sub-Saharan Africa is a result of the nature of family structure, kinship, cultural values, and religion. On the other hand, the 'economic development' view argues that the levels of fertility in sub-Saharan Africa are consistent with the level of economic development and that fertility will fall as the region develops economically (Boserup 1985; National Research Council 1993a). The two views are briefly discussed below, although this thesis does not necessarily test their validity for Mozambique.

(a) Cultural factors

Religion, ancestry and family structure

According to Caldwell and Caldwell (1990b:199), to understand fertility behaviour in Africa one needs an understanding of the fundamental religious beliefs and cultural practices. The reasons for the resistance to fertility to decline in sub-Saharan Africa are cultural and related to a religious belief system that operates directly to sustain high fertility (Caldwell and Caldwell 1987). African society and religion stress the importance of ancestry and descent (Caldwell et al. 1992).

> The importance of ancestors, both living and in spirit, meant that the younger generations assisted the older generations to such an extent that, for males at least, high fertility ultimately brought substantial economic returns. The emphasis on descent meant that high fertility was morally correct and childlessness or rearing few children was evil, whether it was the result of barrenness or the death of all or most children, especially in circumstances where fertility had been irresponsibly controlled (Caldwell et al. 1992:214).

Children are often given ancestors' names and couples with few children can be accused of forbidding ancestors the right to be reborn, condemning them to eventual extinction (Caldwell and Caldwell 1987). Thus,

> ... high fertility (and a considerable number of surviving children) is associated with joy, the right life, divine approval, and approbation by both the living and dead ancestors. Conversely, low fertility is only too easily interpreted as evidence of sin and disapproval. Couples who do not have the approval of their parents fear sterility, and this has been an important influence in maintaining arranged marriage and subsequent homage to the old. When births are slow in coming, or children are sickly or frequently die, one possible cause is ancestral disapproval, and resort is usually made to diviners to identify the cause of disapproval and to suggest ritual and other amends that can be made (Caldwell and Caldwell 1987:416).

These beliefs occur in a family system where high fertility is economically advantageous to the parents. African children are expected to provide long-term net benefit streams by supplying labour, generating monetary income, providing old-age security, and acting as a form of insurance (Fapohunda and Todaro 1988). This makes African children 'net economic assets' to their parents (Caldwell 1982). In what is known as the 'wealth flows theory of fertility decline' Caldwell (1976, 1978, 1982) argues that fertility behaviour in both traditional and modern societies is 'economically rational within the context of socially determined economic goals and within bounds largely set by biological and psychological factors' (Caldwell 1978:553). Caldwell distinguishes two societies in terms of 'net wealth flows' between generations. In the first, the pre-modern societies, the flows are from children to parents or, broadly, from the younger to the older generation while in the latter, modern societies, the flows are in the opposite direction. Fertility decline occurs when the wealth flows are reversed, which takes place only after the family economy has moved from extended to nuclear, so that parents spend increasingly on their children while expecting and receiving little in return. The change from extended to nuclear family system can be triggered by education which reduces the child's potential for work and increases the cost of rearing children through direct (fees, uniforms and stationery) and indirect (better clothing, better appearance, etc.) costs of schooling (Caldwell 1980).

Although Caldwell's wealth flows theory has found some empirical support (see Dow and Werner 1983; Dow et al. 1994, for Kenya; Clay and Vander Haar 1993, for Rwanda) it has been subject to criticisms (Cain 1982; Schultz 1983; Turke 1989, 1991; Kaplan 1994). Cain (1982), for example, questions the generality of the magnitude of the economic benefits provided by children to their parents and the cross-cultural validity of Caldwell's theory, especially for Asia where fertility has declined with little change in the family system (Mason 1997). According to Schultz (1983:163), Caldwell's theory also omits parents' consumer benefits of children and neglects changes in the marginal price of children as distinct from the market price of a child; and that the price of children must be determined independently of the parents' behaviour. Schultz (1983:165-166) continues his criticism of Caldwell's theory by saying that it also fails to explain the factors within and outside the control of parents that cause them to want to increase the schooling of their children and curb their fertility.

On the other hand, supporters of evolutionary theories of fertility (Turke 1989, 1991; Kaplan 1994) challenge Caldwell's direction of intergenerational wealth flows by expecting the net flow of resources to be always from parents to children even when fertility is high. For Turke (1989:76), for example, parents are likely to have invested in offspring throughout the life course, and therefore a system is unlikely to arise in which children more than return the resources and services their parents gave them when they were young. A study by Kaplan (1994), in the communities of Ache, Piro and Machiguenga in South America, rejected Caldwell's wealth flows hypothesis. Wealth flows were from parents to children in all three communities.

Child fostering

Child fostering, or 'the relocation or transfer of children from biological or natal homes to other homes where they are raised and cared for by foster parents' (Isiugo-Abanihe 1985:53), is another support for high fertility in sub-Saharan Africa (Isiugo-Abanihe 1984, 1985, 1994a; Pennington 1991) because it breaks the link between biological and economic parentage. Fostering is also common in Mozambique but the data on its prevalence are scanty and no attempt is made in this thesis to estimate its level.

Children can be fostered out for a variety of reasons: to acquire formal education or a training of a kind the parents are not able to furnish themselves; to become apprentices in a particular craft or trade; to acquire contacts or to establish or strengthen social, economic, or political alliances that will be useful to them or their family; to help with household tasks and services; to provide assistance and companionship to grandparents and childless women; and as a result of a family dissolution originated by divorce, separation, or death of a spouse (Isiugo-Abanihe 1984, 1985; Page 1989).

According to Isiugo-Abanihe (1994a), the institution of fostering derives from the cultural belief that children belong to the extended family or lineage or the community. In the case of both fostering-out and fostering-in, families benefit from the institution. For the fostering-out family, the institution provides a mechanism for reducing the cost of rearing young children which gives the parents a means of managing a large number of children, and offer educational advantages to the children who are sent to relatives with the ability to supply education. The fostering-in family may benefit from the child labour, especially in rural areas where fostered children may assist the household heads in their own strategies for economic and social advancement; and from the strengthening of the obligations of natal parents to the foster parents (National Research Council 1993a:100).

By distributing the costs and benefits of childbearing for kinship, the practice of child fostering lowers the economic cost of children to parents while their potential value in terms of old age insurance and other benefits remains high, leading to a positive intergenerational wealth flow that promotes high fertility (Isiugo-Abanihe 1984, 1985). Thus, fostering out children acts as an adaptive strategy to simultaneously relieve excessive burdens on mothers or parents while maintaining the societal norm of large family size (Isiugo-Abanihe 1994a:171).

Fosterage may also promote high fertility through its proximate determinants, by discouraging family planning because any surplus children can be sent out (Isiugo-Abanihe 1994a); leading to an earlier cessation of breastfeeding and earlier resumption of postpartum fertility if small children are fostered out (Bledsoe and Isiugo-Abanihe 1989:442; Pennington 1991:98); and precipitating earlier marriage and onset of childbearing when girls are fostered to be raised in the household of their future husbands (Bledsoe and Isiugo-Abanihe 1989:442).

Social status of women

The low status of women in sub-Saharan Africa is also believed to promote high fertility. According to Amin and Lloyd (2002:276), improvement in the status or position of women in relation to men is a critical element, and possibly even a necessary condition, for significant fertility decline to occur. Women's economic dependence on men, which characterises the patriarchal family structure of most of sub-Saharan Africa, produces relatively high fertility desires for purposes of risk insurance and old age security (Cain 1993; Mason 1993; Abadian 1996). However, even when women's fertility desires are low they may not be easily met because women have limited decision-making power. In African family structures women have no authority in decisions about family size and the practice of family planning. The widespread payment of bridewealth on marriage is seen as conferring such rights on the husband and older family members who strongly favour large families (Boserup 1985; Caldwell and Caldwell 1987; Frank and McNicoll 1987; Caldwell et al. 1992). In addition to their minimal involvement in decision-making about childbearing women in Africa fear infertility: regular childbearing and many children enhance a woman's prestige and assure respect, while, in contrast, infertility or few children subject her to scorn and ridicule, personal suffering and serious social consequences (see Chapter 7).

(b) Socio-economic development

High fertility in sub-Saharan Africa is also attributed to its lower level of economic development (Boserup 1985; World Bank 1986; National Research Council 1993a). For the World Bank (1986; cited in National Research Council 1993a) high fertility rates in sub-Saharan Africa are not totally unexpected since the region has the world's lowest level of economic development. The World Bank finds the reasons for high fertility in sub-Saharan Africa in a set of economic development indices: low income per capita, high infant and child mortality, high proportion of the work force in agriculture, low levels of adult literacy, low proportion of population in urban areas and difficulties in accessing education, health and family planning services. According to Boserup (1985:383) '…fertility declines...in nearly all countries outside of Africa confirm the expectation that economic development eventually induces reductions in fertility'. Boserup (1985) believes that fertility decline is the result of structural changes in economies where most people become engaged in occupations that are conducive to lower fertility because they are located in urban areas or require high education.

This view is based on the 'classic demographic transition theory' (Davis 1945; Notestein 1945) which assumes that socio-economic progress is a prerequisite for fertility decline. This theory attributes fertility decline to social changes that accompany modernisation, which first produce a decline in mortality and then in fertility. Although the theory has been extensively used, it has also been contradicted by empirical evidence. Evidence from historical Europe (Coale and Watkins 1986) and the developing countries (Bongaarts and Watkins 1996) suggests that the correlation between economic development (as measured by the United Nations Human Development Index) and fertility decline is weak and that fertility transitions can start at different levels of development. For example, the analysis of 69 countries (including 28 in sub-Saharan Africa) by Bongaarts and Watkins (1996) found that the relationship between economic development and pretransitional fertility, the timing of the transition, and the pace of fertility decline deviated substantially from what would be expected if fertility and development were closely linked. This led to the conclusion that 'development alone is insufficient to account for observed variations in the timing of onset of transitions or in variations in their pace and that social interaction should be taken into account' (Bongaarts and Watkins 1996:669).

1.3 The study context

1.3.1 Socio-political and economic setting

Mozambique is located in the southern part of Eastern Africa, with Tanzania to the north; Malawi, Zambia, Zimbabwe and South Africa to the west; and Swaziland and South Africa to the south-west and south. To the east, the country is washed by the Indian Ocean along a coastline of 2, 515 kilometres (Mozambique 1998:15). Its total surface area of 799, 380 km^2 is divided into 11 administrative provinces, which are grouped into three regions (Northern, Central and Southern). The Northern Region includes the provinces of Niassa, Cabo Delgado and Nampula; the Central Region the provinces of Zambézia, Tete, Manica and Sofala; and the Southern Region includes the provinces of Inhambane, Gaza, Maputo Province and Maputo City, the nation's capital (see Figure 1.1).

After gaining its independence from Portugal in 1975, Mozambique went through 16 years (1976-1992) of civil war between the socialist government of ruling FRELIMO (Front for the Liberation of Mozambique) and the RENAMO (National Resistance Movement) opposition movement. The conflict, which was mainly rooted in ideological and political contradictions, and ethno-regional frictions (Agadjanian 2001a:292), destroyed the already weak economy and displaced more than three million Mozambicans (Cossa et al. 1994; Agha, Karlyn and Meekers 1999). Civil war and the socialist economic development model of central planning with a policy of rural collectivisation and state monopoly of all marketing and financial services, adopted after independence, led to economic hardship in the 1980s. In response, in 1987, the Mozambican government introduced an Economic Rehabilitation Program (PRE), funded by the International Monetary Fund and the World Bank, which reversed the declining Gross Domestic Product (GDP) of the late 1980s to high positive growth in the 1990s (Government of Mozambique and UNICEF 1993). Despite exceptional GDP growth, especially since the end of the civil war in 1992, Mozambique remains one of the world's poorest countries. The per capita income was estimated at US$230 in 1999 (World Bank 2000:Table 1), and about 70 per cent of its population lived below the poverty line in 1997 (Ministry of Planning and Finance 1998).

There are remarkable regional differences in level of development and access to resources, infrastructures and services. As can be seen from the selected socio-economic indicators presented in Table 1.2, the Southern Region is the most developed and the Northern Region the poorest. For example, in 1998 the United Nations Human Development Index

(HDI) score and the Real Gross Domestic Product (GDP) per capita in the Southern Region were as twice as high as in Northern and Central Regions, while the United Nations Human Poverty Index (HPI) was at least 20 percentage points lower in the Southern Region. Less than 25 per cent of the population in Northern and Central Regions had access to health services (including antenatal care, childbirth in a maternity ward or health centre, doctor, nurse or midwife in the village), compared with half in Southern Region. The economic development of the countries adjacent to the different regions may partly explain the differences. While Southern Region is close to South Africa, which is the most developed nation in sub-Saharan Africa, Central and Northern Regions face relatively poor countries (Malawi, Zambia, Zimbabwe and Tanzania).

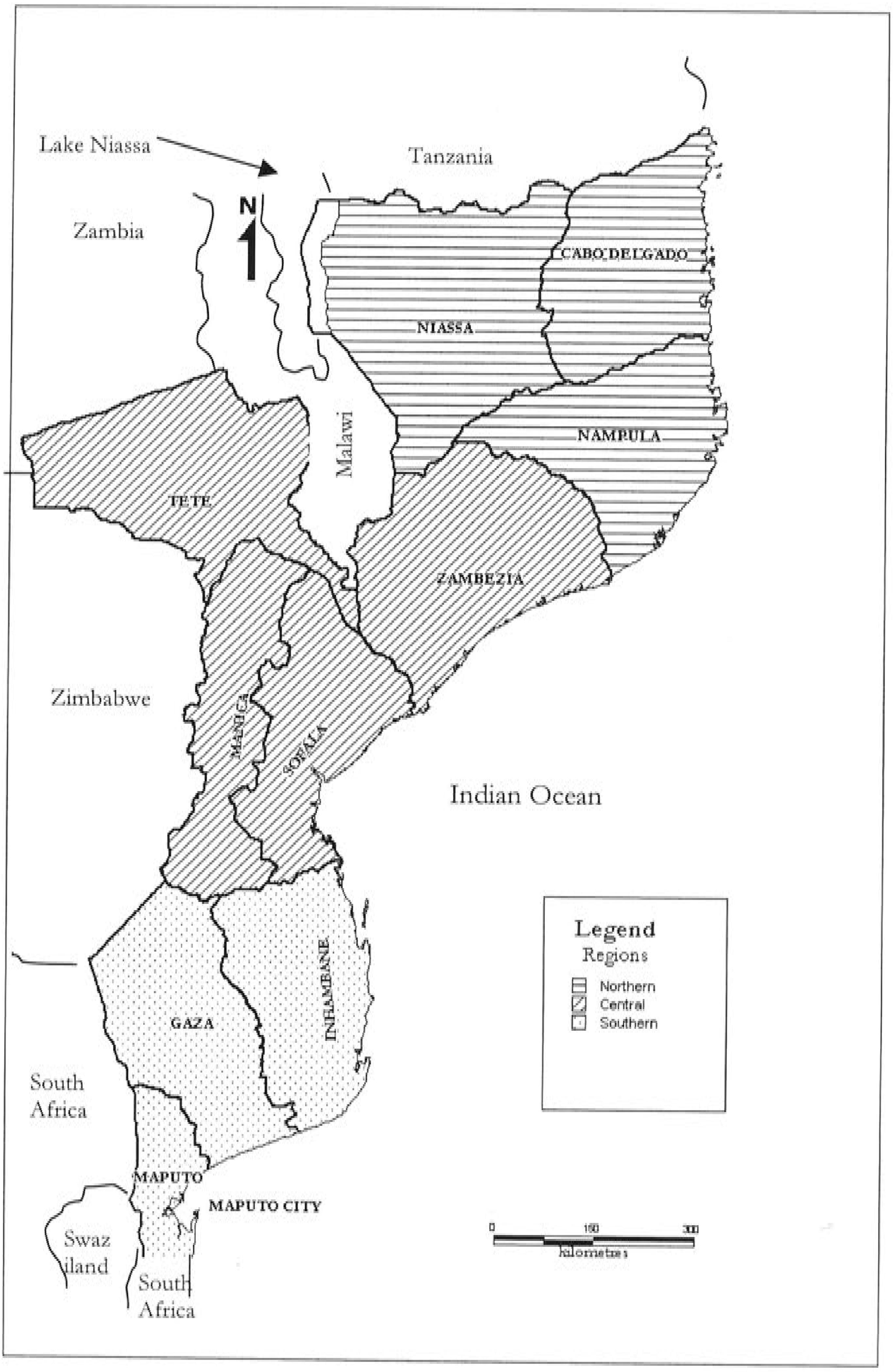
Table 1.2 Selected socio-economic indicators by region, Mozambique

Region	HDI 1998	HPI 1997	Real GDP per capita 1998 (USD)	% without health services
Northern	0.212	64.3	159	77.6
Central	0.266	60.0	185	81.0
Southern	0.427	39.8	460	53.6
Mozambique	0.282	56.8	237	76.2

Note: HDI= Human development index; HPI= Human poverty index; GDP =Gross domestic product.
Source: Mozambique (1999: Tables 5, 6 and 8).

Although the differences between provinces in the same region are generally small (see provincial socio-economic indicators in Appendix Table D4.1), it should be noted that the indicators in the Southern Region are mainly due to the influence of Maputo City, which tends to differ not only from the rest of country but also from the rest of Southern Region's provinces. For example, the HDI score of Maputo City is 1.8 times greater than that of the rest of the Southern provinces, 2.3 times greater than that of Central Region, and 2.9 times greater than that of Northern Region (Mozambique 1999:23). Maputo City also stands out from other provinces in its contribution to the national GDP. In 1998 Maputo City produced 34 per cent of the entire Mozambican GDP, with the remaining Southern provinces producing 13 per cent, the Northern Region 21 per cent and the Central Region 31 per cent (Mozambique 1999:39).

Figure 1.1 Mozambique by regions and provinces



Source: Based on INE database.

1.3.2 Education and literacy

Education is often regarded as one of the most important factors influencing reproductive change, in particular the change from high to low fertility (see Caldwell 1976, 1980, 1982; Cochrane 1979). Because of the combination of colonial heritage and the long period of civil war, Mozambique has one of the lowest literacy rates in the world, especially among females. The education system under the colonial rule was discriminatory and far from inclusive for the majority of the population (Johnston 1990). Official and private schools were accessible only for whites, those of mixed and Asian race, and the *assimilados*, indigenous people who had taken on the Portuguese culture. The only accessible schools for the majority of the African population were the vastly inferior missionary schools. As a consequence of this policy, at Independence in 1975 only 7 per cent of the population could read or write.

To reverse this situation the post-independence government devoted much energy to universal education by introducing co-education, adult education and building of new schools in rural areas. Special attention was also paid to the education of women by carrying out campaigns to persuade the society to enrol girls in school and to persuade husbands not to interfere with their wives' participation in adult education (Johnston 1990). As a result, in the first six years of independence primary school enrolment increased dramatically from 700,000 to 1,376,000, while the increase in secondary education was from 20,000 to 135,000 (Newitt 1995:549).

However, the government effort in promoting mass education was soon ruined by the intensification of civil war, especially from 1983. By 1992 (when the war ended) about 3,530 schools (corresponding to 58 per cent of the number in 1983) had been destroyed or closed, affecting more than 1.5 million pupils (Ministério da Educação 1994a:8). The Central Region was the worst affected with over 80 per cent of the existing schools in 1983 destroyed or closed by the end of the war in 1992, compared to 49 per cent in Northern Region and 39 per cent in Southern Region. This led to a drop in school attendance during this period. In 1997 the proportion of people aged 19 and over (people who were of normal school age during the civil war period) who had never attended school was higher than among the younger generation, reflecting low levels of school enrolment during the war period, especially during 1983-1992 (Wils and Gaspar 2002:50).

Post-war educational statistics (Ministério da Educação 1994c, b, 1999) show that both the number of schools and school enrolment have been increasing since the end of the war, but, as can be seen from Table 1.3, the literacy rate remains low. In 1997, only 40 per cent (28% in rural and 65% in urban areas) of the population was literate and there was a large difference between the sexes: only 25 per cent of females were literate compared with 55 per cent of males. There were also sex differences in the improvement of adult literacy rates from 1980 to 1997 with the male rate increasing by 14 percentage points compared with 11 percentage points for females and an average (both sexes) of 12 percentage points. As one would expect, given the regional differences in socio-economic development discussed in the previous section, literacy rates and their percentage-points improvement between 1980 and 1997 are lowest in Northern Region and highest in Southern Region.

Table 1.3 Adult literacy rate (%) by sex and region, Mozambique 1980 and 1997

Region	1980			1997			1997 – 1980		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Northern	20.8	32.9	9.7	28.1	43.7	13.8	7.3	10.8	4.1
Central	25.6	40.0	11.9	37.3	55.5	21.3	11.7	15.5	9.4
Southern	43.9	57.7	31.1	61.0	75.5	50.5	17.2	17.8	19.4
Mozambique	27.8	41.0	15.4	39.5	55.4	25.9	11.7	14.4	10.5

Sources: 1980, CCR (1983b:Table 6); 1997, Mozambique (1999:Table 5).

The majority of people who have been to school have not gone beyond primary education. According to the 1997 census only 12 per cent (13% males and 9% females) of educated people had secondary or higher level of education in 1997. This percentage was higher in Southern Region (16%) than in either Central Region (10%) or Northern Region (8%). Devji (2001) used the 1997 census data to calculate the average years of education for the population aged 15 and over and found that, on average, Mozambicans had 1.3 (1.9 for males and 0.8 for females) years of education, with 0.9 years in Northern Region, 1.1 years in Central Region and 2.2 years in Southern Region (Devji 2001:28).

1.3.3 Ethnicity and religion

Mozambique is ethnically a diverse country; over twenty different cultural subgroups of both matrilineal and patrilineal systems of descent can be identified. These can be grouped into six major ethnic groups: the Tsonga, Sena/Ndau, Lomwe/Chuwabo, and Macua, 'Other' local and Portuguese/foreigner. According to the 1997 census the largest ethnic group is the Macua composing 27 per cent of the total population, followed by the Tsonga

(24%), Sena/Ndau (17%), Lomwe/Chuwabo (15%) and 'Other' local (10%). The Portuguese/foreigner ethnic group accounted for about 7 per cent of the population in 1997 and includes an elite of people of all ethnic groups who declared that Portuguese was their mother tongue (89%), and 'Indo-Europeans'. Indo-Europeans are the descendants of Europeans, mainly Portuguese, or of Arab and Indian traders, some of whom arrived in coastal Mozambique before the Portuguese; others were brought from the former Portuguese colony of Goa, now part of India, as labourers to work on plantations in the eighteenth century (Government of Mozambique and UNICEF 1993:36-37).

The socio-economic characteristics of women belonging to each of these groups are summarised in Table 1.4. The Portuguese/foreigner group is the most educated and urbanised. Among the local ethnic groups, the Tsonga, who live in the Southern Region, are the most educated and urbanised, followed by the Sena/Ndau of Central Region. The Macua are the least educated and the Lomwe/Chuwabo the least urbanised. There are also ethnic differences in religious affiliation. While the Macua are predominately Muslim, the others are mainly Christians. In terms of descent system, the Macua and the Lomwe/Chuwabo are matrilineal whereas the Tsonga and the Sena/Ndau are patrilineal. Finally, the 'Other' category is a residual including all the remaining local ethnic groups, some of which are patrilineal and others matrilineal.

Table 1.4 Percentage of women 15-49 by selected socio-economic characteristics, Mozambique 1997

Ethnicity	Literacy Rate (%)	% Urban	Religion				Descent system
			Christian	Muslim	Other	No religion	
Tsonga	52.5	45.3	73.5	0.7	7.9	17.9	Patrilineal
Sena/Ndau	22.9	27.1	43.6	0.7	3.1	52.6	Patrilineal
Lomwe/Chuwabo	15.5	13.7	76.4	7.3	0.2	16.1	Matrilineal
Macua	12.3	20.6	39.1	47.4	1.2	12.3	Matrilineal
Other	16.2	14.3	51.3	31.3	0.9	16.5	Mixed
Portuguese/foreigner	91.0	83.8	71.8	16.1	1.9	10.2	Mixed
All	29.4	29.4	57.2	18.3	3.1	21.4	

Source: Computed from 1997 Census.

Mozambique is also multi-religious. According to the 1997 census 54 per cent of Mozambicans were Christians, 18 per cent Muslims, 25 per cent did not have any religious affiliation and 3 per cent belonged to other religions. Muslims are mainly in Northern Region whereas Christians are mostly in Central and Southern Regions (Table 1.5). The Islamic influence in Northern Region arises from a long history of trade with Arab Muslim traders from Gulf and Indian Ocean states starting from the eighth century (Martinez 1989; Daniel 1995). This influence extends down the whole coast to south of Inhambane City in Southern Region. On the other hand, Central and Southern Regions were more directly affected by Christianity, but in contrast to Islam, it did not achieve a deep religious and cultural impact, and exists side by side with strong animist and *Zione* (Zionist)[3] religions (Government of Mozambique and UNICEF 1993:37).

Table 1.5 Percentage distribution of population by region and religion, Mozambique 1997

Region	% of population who are					
	Catholic	Protestant	Muslim	Zionist	Other	No religion
Northern	25.0	12.3	46.5	1.2	1.1	13.8
Central	27.5	12.4	5.2	17.1	1.5	36.3
Southern	17.6	12.0	1.9	40.5	8.4	19.6
Mozambique	24.1	12.3	18.1	17.9	3.2	24.5

Source: Computed from 1997 census.

An interesting feature of Table 1.5 is that a quarter of the population reported not having any religion. There are two possible explanations. First, it is probable that many people reporting no religion are the ones who believe only in traditional religions. The veneration of ancestors is a common practice among all ethnic groups in the country, except, perhaps, Indo-Europeans. Indeed, the majority of those who reported having a religion also believe in and venerate their ancestors. Although the question on religion in both census and DHS was open-ended, it appears that people in Mozambique do not regard cultural practices as a religion. Secondly, a considerable proportion of Mozambicans may have deserted religion after it was subject to repression by the post-independence government. The FRELIMO government perceived religion as an 'obscurantist manifestation that served to deceive, trick and divide the people' (Cabrita 2000:120). Religious teachings were banned from all government schools; church-run schools and health establishments reverted to state institutions; and bank accounts of dioceses, missions, church institutions and missionaries were frozen. Particularly affected by the official policy on religion was the Catholic Church because of its direct connection with the colonial power. The enrolment of students at seminaries was forbidden unless they were older than 18 years and had complied with their military obligations (Hoile 1989; Cabrita 2000).

[3] Zione is a healing religion.

1.3.4 Demographic profile

Mozambique's population almost tripled in 47 years, growing from 6.5 million in 1950 to 16.1 million in 1997 at an annual growth rate of 1.9 per cent (INE 1998c:7). Over this period, the annual growth rate increased from 1.6 per cent in the period 1950-1960 to 2.5 per cent in 1970-1980, declining to 1.7 per cent in 1980-1997. The growth rate for the period 1970-1980 may be overestimated as a result of different coverage of the 1970 and 1980 censuses. The 1970 census had limited coverage, especially in the Northern Region, due to the effect of the national liberation war, leading to a large population undercount, with an omission rate of 13.4 per cent, compared with 3.8 per cent in the 1980 census (Gaspar 2002:9). On the other hand, the relatively low growth rate in the period 1980-1997 is a reflection of high mortality during the civil war in which more than one million Mozambicans are estimated to have lost their lives (Baden 1997:9).

Table 1.6 Population by region and province, Mozambique 1997

Region/Province	Population		Density	% Urban
	Number	%	(Inhabitants/km^2)	
Northern	**5,259,920**	**32.7**	**17.9**	**23.0**
Niassa	809,757	5.0	6.3	22.3
Cabo Delgado	1,382,223	8.6	16.7	16.3
Nampula	3,067,940	19.1	37.6	25.2
Central	**6,740,393**	**41.9**	**20.1**	**22.0**
Zambézia	3,100,935	19.3	29.5	12.8
Tete	1,227,799	7.6	12.2	14.1
Manica	1,040,984	6.5	16.9	27.4
Sofala	1,370,675	8.5	20.2	40.3
Southern	**4,098,932**	**25.4**	**24.0**	**49.0**
Inhambane	1,158,875	7.2	16.9	19.7
Gaza	1,118,542	6.9	14.8	24.3
Maputo Province	832,124	5.2	31.9	63.1
Maputo City	989,391	6.1	3,298.0	100.0
Mozambique	**16,099,246**	**100.0**	**20.1**	**29.0**

Source: INE (1998c:Tables 1.2 and 1.3).

According to the results of the 1997 census 33 per cent of the population live in Northern Region, 42 per cent in Central Region and 25 per cent in the Southern Region. Nampula and Zambézia are the most populous provinces, whereas Niassa, Maputo Province and Maputo City are the least populous. In terms of population density, there are 20.1 inhabitants per square kilometre. The population density is highest in Southern Region, and at a provincial level it is generally high in the coastal provinces (Maputo City, Maputo Province, Nampula and Zambézia) (see Table 1.6).

In general, Mozambique's population is mainly concentrated along coastal areas. Because these areas enjoy better living condition and include the majority of urban centres the main internal migration flows are from west to east, that is, from the interior to the coast, and from north to south, owing to high socio-economic development in the Southern Region (Muanamoha 1995). Thus, according to the 1997 Census, the Southern provinces had high in-migration rates, especially the provinces of Maputo and Maputo City where as many as 50 per cent and 60 per cent, respectively, of the enumerated population were in-migrants, that is, were born elsewhere (INE 1998c).

International labour migration is also important and has been motivated historically by the existence of competitive employment opportunities in neighbouring countries. Migrants have usually been males of working age who migrated to the mining, industrial and agricultural sectors of South Africa, Zimbabwe and Zambia. Among these, the most important was the migration to the mines of South Africa, which involves mainly the males from the Southern Region. According to Newitt (1995), labour migration from the Southern Region to South Africa began in the early nineteenth century when the rapid development of sugar growing in Natal increased the demand for labour which could not be met by the local population. The demand for Mozambican labour increased further at the end of the nineteenth century with the growing mining industry so that by the beginning of the twentieth century between 50,000 and 90,000 Mozambicans were working in the mines of South Africa (Newitt 1995:492). The number of Mozambicans working in the mines of South Africa peaked at 113,300 in 1970, and in 1999 the number was estimated at 73,097 (Gaspar 2002:8). Since mainly young adult males are involved, labour migration may have a demographic effect in the emigrating communities, especially on nuptiality through the shortage of males of marriageable age, on fertility through long separation of spouses and on infertility through the spread of venereal diseases in the community by the migrants, who are likely to have contact with prostitutes in their working areas.

The Mozambican population is predominantly rural. However, the proportion of the population living in urban areas more than doubled in 17 years, increasing from 13 per cent in 1980 (CCR 1983a:3) to 29 per cent in 1997. The Southern Region is the most urbanised with 49 per cent of its population living in urban areas in 1997, compared with only 23 per cent in Northern Region and 22 per cent in Central Region (see Table 1.6). The high proportion of urban population in Southern Region is because this region includes Maputo

City, the biggest city in the country. When Maputo City is excluded, the proportion of urban population is only 25 per cent, which is comparable with the other regions.

Fifty-two per cent of the population in 1997 were female, corresponding to a sex ratio of 92 males for every 100 females. This ratio is three percentage points lower than in 1980 (95 per cent), reflecting higher losses of males than females during the civil war. Because of its high fertility (see Chapters 3 and 4), Mozambique has a very young age structure. According to the 1997 Census 45 per cent of the population are below the age of 15 and only 3 per cent are aged 65 years and over, corresponding to a median age of just 17.5 years. As a result, the dependency ratio, the ratio between the population aged 0-14 and 65 + and the potential labour force (15-64), is high at 91 per cent, ranging from 73 per cent in Maputo City to over 100 per cent in Tete and Niassa, the provinces with the highest total fertility rate in 1997 (see Chapter 4).

The infant mortality rate (IMR) is among the highest in the world and has been declining only slowly (see de Araújo 1999; Chipembe 2001). The infant mortality rate was 231.0 deaths per thousand births in 1960, 193.0 in 1970, 156.1 in 1980 and 145.5 in 1997 (Gaspar 2002:14). The absence of a significant improvement in IMR, especially in the last intercensal period, reflects the effect of the civil war. As for the other indicators, there are marked regional differences: the infant mortality rate is particularly high in Northern (163 deaths per thousand births) and Central (175 deaths per thousand births) Regions where in 1997 about 16 per cent of new-born babies were expected to die before reaching their first birthday, comparing with only 10 per cent in Southern Region (Mozambique 1999:Table 23).

Among the factors contributing to the high IMR in Mozambique are high levels of poverty, illiteracy and lack of access to health services. A multivariate analysis by de Araújo (1999) found that regional differences in IMR were substantially reduced once socio-economic characteristics were controlled for. Her analysis suggests that access to antenatal care and piped water are amongst the most important determinants of child survival. Children whose mothers did not have antenatal care were 90 per cent more likely to die before age one than their counterparts whose mothers attended an antenatal clinic; and children whose households did not have access to piped water were 75 per cent more likely to die before reaching the age of one than those with access to piped water. Surprisingly, de Araújo (1999) did not find any significant effect of mother's education on child survival, a reflection, perhaps, of the broad grouping used in the analysis (0-4 and 5+ years of education).

Because of high infant mortality, the life expectancy at birth is also low: it was 33.8 years in 1960, 38.7 years in 1970, 43.5 years in 1980 and 42.3 years in 1997 (Gaspar 2002:14). In 1997 the expectation of life at birth in Southern Region (50 years) was 10 years higher than in both Northern and Central Regions. The decline in the expectation of life from 1980 to 1997 was due to increases in mortality arising from civil war and the effect of HIV/AIDS. Given the increasing levels of HIV infections, life expectancy is not expected to improve in the very near future. The reported cases of AIDS in Mozambique increased from 98 in 1990 to 6,361 in 1999 (unpublished data obtained from the Ministry of Health). In 2001 it was estimated that 1.1 million Mozambicans were infected with HIV, corresponding to a prevalence rate of 13 per cent among the adult population (UNAIDS/WHO 2002). Ministério da Saúde et al. (2000) carried out population projections with, and without, the effect of HIV/AIDS from 2000 to 2010. They assumed, in the projection with HIV/AIDS impact incorporated, that the HIV/AIDS prevalence rate would level off at 17 per cent in 2004, leading to further decline in life expectancy at birth to 35.9 years in 2010. The regional projected life expectancies with HIV/AIDS taken into account for 2010 are 43 years for Southern Region, 31 years for Central Region and 36 years in Northern Region (Ministério da Saúde et al. 2000:58).

1.4 Research problem and objectives

Most of the fertility-related studies in Mozambique are either reports based on censuses and national surveys, or micro-area studies, mainly of Maputo City, which do not provide a comprehensive picture of fertility behaviour in the country. The works by Heisel (1968), Gaspar (1989) and Agadjanian (2001b) are the few exceptions. In analysing the parity of women aged 45 – 49 years from the 1940 and 1950 censuses, Heisel (1968) found that the average parities for women in this age interval were highest in Central Region and lowest in Southern Region. Although he considered these figures to be seriously underreported, the pattern of variation among the regions was consistent and has prevailed in the 1980s (CCR 1983a) and 1990s (Gaspar and Ruiz 1994; Gaspar et al. 1998; INE 1998c). Using a much longer time series, the 1940, 1950, 1960, 1970 and 1980 censuses, Gaspar (1989) evaluated the quality of the fertility data and estimated the TFR to find that it had remained almost unchanged at between six and seven children per woman during that period. More recent official estimates suggest that TFR remained above six children per woman in the 1980s, declining slightly to between 5.6 and 6.0 children in the late 1990s (CCR 1983a; Gaspar et al. 1998; INE 1998b, c).

Studies on selected small areas show important socio-economic differentials in fertility behaviour. Agadjanian (1995) found that in Maputo City fertility had started to decline and that education, employment status and the degree of integration into urban life were significantly associated with women's contraceptive and childbearing stopping behaviours. Lopes and Santos conducted local demographic surveys in the cities of Maputo (in 1994) and Nampula (in 1996) and in rural areas of Inhambane and Gaza provinces in 1995, and reported variation in fertility according to women's background characteristics, such as education, employment status and access to piped water (Lopes and Santos 1995a, b, 1996). For example, in Maputo City, they found that women with up to primary education had a TFR of 6.0 while those with secondary or higher education had a TFR of 3.5 children per woman; women who were wage earners had a TFR of 3.8 against 5.7 for those who were not wage earners (Lopes and Santos 1995a:Table 5). Using multivariate techniques, Mazive (1999) found that race and place of birth also affected fertility in Maputo City, with fertility being lower for whites and coloureds than blacks, and among women born in Maputo City than those born elsewhere.

Although the above review provides useful information about fertility behaviour in Mozambique, some important questions remain unanswered. Has fertility started to decline in Mozambique? What explains the observed regional and provincial differences in fertility? How important are the effects of socio-cultural and economic diversity on fertility and its proximate determinants (nuptiality, postpartum infecundability, infertility and contraception)?

Since the end of civil war in 1992, several nationally representative surveys have been conducted, but there has not been a systematic evaluation and analysis of their results in order to answer these questions. For most of the surveys the published reports do not go beyond giving statistical tables or basic measures. In an attempt to fill this gap, the present study assesses the fertility levels, trends and differentials in Mozambique. The study also examines the degree to which socio-cultural and economic diversity is associated with fertility and its main proximate determinants, the biological and behavioural factors bearing direct influence on fertility. The analysis is conducted at both the individual (with the woman as unit of analysis) and provincial (province as unit of analysis) levels. The provincial level analysis is aimed at assessing the extent to which the social, cultural and economic characteristics of a province are related to its fertility level.

Specifically, this study seeks to:

(i) evaluate the national, regional and provincial estimates of fertility levels and patterns in Mozambique;

(ii) assess the national, regional and provincial fertility trends in Mozambique;

(iii) examine the factors associated with regional and provincial variation in fertility;

(iv) assess the socio-economic differentials of fertility;

(v) examine the national and regional marriage patterns and their socio-economic determinants;

(vi) examine the national and regional durations of breastfeeding, postpartum amenorrhoea and postpartum sexual abstinence, and their socio-economic determinants;

(vii) examine the national and regional levels of infertility and their socio-economic determinants;

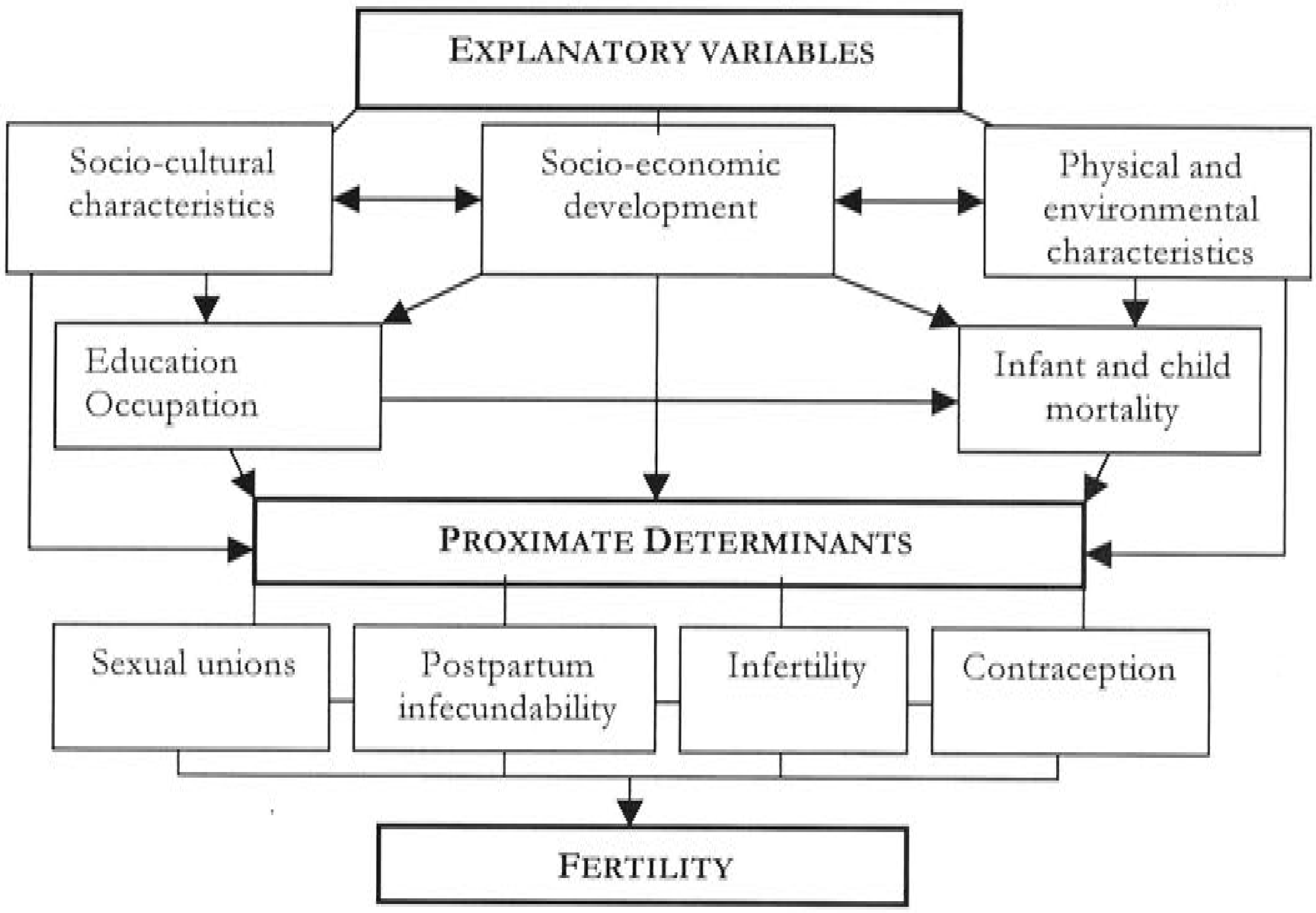
(viii) examine the national and regional levels of contraceptive use and their socio-economic determinants; and

(ix) examine the fertility-reducing effect of the proximate determinants of fertility.

1.5 Conceptual framework

The framework for the analysis in this thesis assumes that both socio-cultural and economic development factors discussed above can influence fertility. The framework, which is presented in Figure 1.2, was adapted from Bongaarts's (1978) model of proximate determinants of fertility. The independent or explanatory variables influence changes in fertility through the intermediate variables or proximate determinants. There are three categories of the independent variables: the socio-cultural characteristics, socio-economic development and the physical and environmental characteristics. The main factors included in each category of explanatory, intermediate and dependent variables are presented in Table 1.7.

Figure 1.2 Theoretical framework for the analysis of fertility differentials in Mozambique



Source: Adapted from Bongaarts (1978).

The three categories of the independent variables are interrelated. The level of socio-economic development is, at least to some extent, related to the natural resources available in a given region or province, which depend on the physical and environmental characteristics. Economic development influences social change in a society by facilitating or hindering social interactions (Bongaarts and Watkins 1996:668) or bringing new opportunities, goods, and services, which may affect tastes and aspirations (Cleland 1985:226).

The level of economic development determines the availability of infrastructure such as schools, health facilities, roads, employment opportunities, level of urbanisation, etc. The availability of such infrastructure is associated with high level of education and labour force participation outside the home, better access to family planning services and low childhood mortality. Thus, women living in different regions or provinces are expected to have different reproductive behaviour. Furthermore, economic development may increase access to breastmilk substitutes, which may shorten the duration of breastfeeding and sexual abstinence, and improve nutrition and health, which may increase fertility by reducing infertility (Acsadi and Johnson-Acsadi 1990b:156).

Environmental characteristics will influence the proximate determinants through, for example, the effect on childhood mortality. Physical and climatic conditions are related to the incidence and prevalence of certain diseases such as malaria which are associated with high levels of childhood mortality (Ewbank and Gribble 1993; Jhamba 1999; Root 1999) and high prevalence of infertility (Henin 1981; Gray 1983; Larsen 1996). An early child death truncates breastfeeding and thus permits an early return to ovulation, and shortens the period to next birth, leading to more live births during a woman's reproductive career than if infant and child mortality were low. Infertility would have the opposite effect at both individual and societal levels.

Socio-cultural characteristics can affect the proximate determinants either directly or through education or occupation. For example, the timing and prevalence of marriage and the practice and duration of breastfeeding and postpartum sexual abstinence are culturally determined. Different socio-cultural groups may exhibit different sexual behaviour which influences the level and prevalence of infertility (Frank 1983). Also, the adoption of fertility control may vary according to religion, ethnicity or marriage type, polygynous or monogamous (Gage 1995; Addai 1999).

The type of marriage may influence all the proximate determinants considered in this study. Women in polygynous marriages may breastfeed their children and abstain from sexual intercourse after a live birth longer than women in monogamous unions, because the polygynous husbands have other wives for sexual relations while the monogamists do not (Lesthaeghe 1989). Polygyny is also associated with an early age at marriage for women and a large age gap between spouses that may make husband-wife communication on the subject of family size more difficult, and hence make them less likely to adopt contraception. The prevalence of pathological infertility may be higher among polygynous women since their husbands have multiple sexual partners, which facilitates the spread of sexually transmitted diseases (STDs), the main causes of infertility in sub-Saharan Africa (see Chapter 7).

Traditional practices from different ethnic groups may influence the age at marriage and the duration of breastfeeding and postpartum abstinence. The prevalence of STDs may differ across ethnic groups, because of ethnic differences in sexual behaviour (Frank 1983; Caldwell and Caldwell 2000). Religion may affect contraceptive use through education and social organisation, such as a marriage pattern including the practice of polygyny. For example, Muslims tend to have earlier marriage and to be more tolerant of polygyny than Catholics (see Lesthaeghe 1989; National Research Council 1993a).

The relationship between education and fertility is non-linear and not monotonic. In most cases education and fertility do not have a monotonically inverse relationship; fertility may first rise with education and then fall (Cochrane 1979, 1983). Education may reduce fertility through high contraceptive use and later age at marriage. However, it may influence other proximate determinants of fertility, such as breastfeeding, postpartum abstinence, and pathological infertility, in a way that tends to increase fertility. As a consequence, in the first phase of socio-economic development, fertility may rise as a response to shorter periods of breastfeeding and postpartum abstinence, before contraceptive use becomes widespread (Kirk and Pillet 1998).

The effect of education is linked to the type of employment and place of residence, since many factors affecting individuals are partly determined by their place of residence (Cochrane 1983). The presence in the place of residence of contraceptive services, schooling opportunities and health facilities, employment opportunities and the exposure to disease varies between rural and urban areas. People in urban areas have generally better access to these services than in rural areas.

Education and place of residence may also influence pathological infertility. On the one hand, the incidence of infertility may increase in urban areas through the high incidence of STDs related to high sexual mobility, exogamy and prostitution. On the other hand, the greater availability of antibiotics may reduce it. Women with a little education may have higher fertility than women with no education at all, because the former have lower infertility and usually shorter durations of breastfeeding and postpartum abstinence (Bongaarts, Frank and Lesthaeghe 1984).

The main variables used in the analysis are presented in Table 1.7. The aggregate level analysis variables are used only in Chapter 4 where the relationship between the provincial level of fertility and socio-economic indicators is examined.

Table 1.7 Main variables used in the analysis

		Individual level analysis	Provincial level analysis
Independent Variables	Socio-cultural	Ethnicity (language)[a] Religion[a] Type of marriage[a]	Proportion speaking Portuguese[b] Proportion Muslims[b] Proportion in polygynous union[a]
	Socio-economic development	Education	Proportion literate[b]
		Employment status Occupation	Proportion in agriculture[b] Proportion in modern sector[b]
		Place of residence	Proportion urban[b]
		Survivorship of children[b]	Infant mortality rate[b] Under five mortality rate[b] Life expectancy at birth[b]
			Human development index[c] Gross domestic product[c]
	Physical and environmental	Region Province	
Proximate Determinants	Sexual unions	Age at first marriage[a]	Singulate mean age at marriage[b], Mean/Median age at marriage[a]
	Postpartum infecundability	Duration of breastfeeding[a]	Mean/Median duration of breastfeeding[a]
		Duration of amenorrhoea[a]	Mean/Median duration of abstinence[a]
		Duration of abstinence[a]	Mean/Median duration of abstinence[a]
	Pathological infertility	Childlessness (45-49)[b] Infertility[a]	Proportion childless (45-49)[b] Proportion infertile[a]
	Contraception	Contraceptive use	Contraceptive prevalence rate[a]
Dependent Variable	Fertility	Number of children ever born[ab] Had a birth in the last year?[ab]	Total fertility rate[b] Proportion had birth in the last year[b]

Sources: a 1997 DHS; b1997 Census; c Other sources, see Chapter 4.

Independent variables

Religion: religious affiliation of a particular person. There are six religious categories (Catholic, Protestant, Muslim, Zionist, Other religion and No religion) grouped from the responses on an open-ended question '*What is your religion or belief?*'

Ethnicity: Ethnic affiliation is defined according to the responses to an open-ended question on first language '*In which language did you lean to speak?*'. Six ethnic groups were derived (Tsonga, Sena/Ndau, Lomwe/Chuwabo, Macua, Other local, and

Portuguese/foreigner) by grouping the first language using the language classifications in Guthrie (1970) and NELIMO (1989)[4].

Type of Marriage: indicates whether a currently married (i.e. in a union) woman has or does not have one or more co-wives.

Employment Status: Indicates current type of employment of a woman or husband and comprises four categories: Not working, Unpaid/familial worker, Self-employed/informal sector, and Modern/formal sector.

Education: the highest educational level attained by an individual. In this study, this is classified as no education at all, primary, and secondary or high school. This classification was preferred to years of schooling because the Mozambican system of education allows people coded with the same number of years of schooling to have different levels of education[5], and the corresponding years of schooling were calculated for the DHS but not in the census.

Place of Residence: Refers to rural or urban residence. A woman is classified as urban if she lives in an agglomeration classified as urban.

Proximate determinants

Marriage (Sexual Union): a woman is married if she is in a sexual union irrespective of it being traditional, civil or religious marriage (see Chapter 5).

Postpartum Infecundability: a period after a birth in which a woman cannot conceive because she is either amenorrhoeic or abstaining from sexual intercourse, with the length of the former depending on the duration and intensity of breastfeeding (see Chapter 6).

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[4] The Tsonga ethnic group includes the speakers of Xichangana, Xitswa and Xironga; ethnic Sena/Ndau the speakers of Cisena, Cimanica or Cishona and Cindau; ethnic Lomwe/Chuwabo the speakers of Elomwe, Echuwabo and Lolo or Malolo; ethnic Macua the speakers of Emahkuwa and Ekoti or Angocheana; 'Other' local the speakers of Bitonga, Cicopi, Shimakonde, Cinyanja, Ciyau, Kiswahili, Kinwani, Chiute or Chiutewe and Cinhungue and any other local language; and Portuguese/foreigner the speakers of Portuguese and any other European or Asian language.

[5] For example a person with a third year of Commercial Institute (equivalent to 11 years of schooling) will have the same code as a person in third year of primary school, 3.

Pathological Infertility: the inability to produce a live birth after a reasonable period of exposure to regular intercourse without using any contraception.

Contraception: any deliberate practice aimed at avoiding pregnancy.

Dependent variables

Number of Children Ever Born: total number of live births a woman aged 15-49 has had by the time of the census or survey.

Births in last year: whether or not a woman aged 15-49 at the census or survey had a live birth during the previous twelve months.

1.6 Organisation of the study

This thesis is organised into 10 chapters. Chapter 2 reviews the sources of demographic data in Mozambique and evaluates the quality of the fertility data from the 1980 and 1997 censuses and 1997 MDHS. This evaluation is not aimed at correcting the errors, but at identifying their pattern in order to have a better interpretation of the resulting estimates. The strategy used in selecting respondents for the qualitative data collection is also discussed in this chapter. In Chapter 3 several indirect techniques are applied to the data to estimate the levels and pattern of fertility as well as to assess the trends. Chapter 4 uses the fertility estimates from Chapter 3 to examine provincial and socio-economic variation in fertility. Chapters 5, 6, 7 and 8 discuss each of the main proximate determinants of fertility (nuptiality, postpartum infecundability, infertility and contraception) in terms of regional and socio-economic differentials, using both bivariate and multivariate approaches. In Chapter 9 the four proximate determinants are integrated into the Bongaarts framework to determine their relative effect on fertility. Finally, Chapter 10 draws conclusions from the analysis and points some policy implications.

Chapter 2

DATA SOURCES AND METHODOLOGY

2.1 Introduction

The main data used to analyse fertility levels, trends and differentials, and the proximate determinants in this study include published and unpublished tables from the 1980 Population Census (PC), and primary data (individual records) from the 1997 Population and Housing Census (PHC) and from the 1997 Mozambique Demographic and Health Survey (DHS). All these data were collected by the Instituto Nacional de Estatística (INE). These quantitative data are complemented by qualitative information collected by the author through focus group discussions, in-depth interviews and participant observation.

This chapter begins by evaluating the main quantitative sources available. It includes a general review of the sources of demographic data in Mozambique that can be used to derive fertility estimates, and a discussion of the data sources focusing on geographic coverage, collection procedures and quality of reporting. The qualitative sources are discussed in the following section. The last section presents and discusses the analytical tools used in the study.

2.2 Quantitative sources

2.2.1 A general review

One of the common problems for population research in developing countries such as Mozambique is the lack of reliable data. Vital registration in Mozambique is incomplete because most of the population do not understand the importance of reporting vital events as they occur, and because of the poor coverage of the events by the registration system. The long distance between residence (especially in rural areas) and the district headquarters, where the registration takes place, contributes towards delays or failure in registering births. Often the registration of a birth is made when the child reaches school age when a birth certificate is required for enrolment. This leads to a greater chance that a child who dies before reaching school age or does not enrol in school will not be registered. For this reason, the more reliable data for demographic analysis are from censuses and surveys.

The history of censuses in Mozambique under the Portuguese administration dates back to 1928 (INE 1999a), but, the 1930 census was the first to enumerate all people in the country; in the 1928 census only the non-indigenous population was enumerated (INE 1999a). From 1930 to 1970, the censuses were repeated every ten years for the whole population and every five years for the non-indigenous population. The recording took place at an assembly in each community rather than by a house-to-house canvass (Heisel 1968:441). The results were published with separate volumes for each racial group, indigenous and non-indigenous, except for 1960 and 1970 when, because of the political instability caused by the beginning of the struggle for independence by FRELIMO (see Chapter 1), there was only one volume for all racial groups (INE 1999a).

These censuses included questions on age, sex, marital status, mortality and fertility. The information on fertility included number of children ever born by sex and age of mother. There was no question on current fertility. The children ever born were seriously underreported, partly because of the characteristics of a census by assembly, and specifically through the need to resort to the help of local headman in order to get information on absent women. Headmen were more likely to omit recent births and children who had left home than were the women themselves (Heisel 1968). The data from the censuses conducted in the colonial era are not available for this study.

The first post-independence census was conducted in 1980. Although the Government intended to continue the tradition of censuses every ten years, the civil war that followed immediately after independence (see Chapter 1) prevented a census from being taken in 1990. However, there were two sample surveys of interest conducted in the war period: the 1991 National Demographic Survey (IDN), which replaced the census scheduled for 1990 (Gaspar and Ruiz 1994), and the 1987 Reproductive Behaviour of Mozambican Women Survey (Monreal 1991). Both surveys were intended to be national in coverage, but were reduced to cover less dangerous areas only. There is no information on what proportion of the country was omitted.

The second census after independence could only be conducted in 1997, the same year as the first Demographic and Health Survey (DHS). More details about the 1997 census and

DHS are given in the next section. There were two additional national surveys, the 1995 National Multiple Indicators Survey (Governo de Moçambique and UNICEF 1996) and the 1996 National Household Survey (INE 1998b).

2.2.2 Description of the quantitative data sources

(a) The 1980 Population Census

The data from the 1980 Census included information on fertility, mortality and migration. The census moment was midnight on 1st August and all the information, except labour force participation, with a reference period of a week, births in the last year and migration data, refers to the situation at this date. The census combined *de facto* and *de jure* systems of enumeration and included people who were absent from the household for a period of less than six months.

Because of the poor cartography and difficult accessibility, in a few rural areas the data were collected 'by concentration', that is, the enumeration took place at an assembly in each community rather than house-to-house. This may have increased the chance of omission since the enumeration was limited to people who went to the assemblies. However, because this procedure was only applied in very few rural areas with low population density, it is not believed to have had a significant impact on census coverage. The overall omission rate was estimated to be 3.8 per cent (CCR 1983a:2).

(b) The 1991 National Demographic Survey

The 1991 National Demographic Survey (IDN) covered 56 per cent of the total population (Gaspar and Ruiz 1994:2). The sample was designed to be representative at the provincial level, but because of political instability, some areas were not covered. This makes its reliability questionable and therefore these results will not be considered.

(c) The 1995 Multiple Indicators Survey

The 1995 Multiple Indicators Survey had a sample size of 6,433 households. The sample was representative at national and provincial levels (Governo de Moçambique and UNICEF 1996). The target population was all women aged 15 to 49. The survey collected data on fertility, maternal and child health, and infant and child mortality. Only the published report of this survey was available for this analysis.

(d) The 1997 Population and Housing Census

The 1997 Population and Housing Census (1997 PHC) collected data on population and household characteristics. As for the 1980 Census, the census moment was the midnight of 1 August. Taking full advantage of better census mapping, the procedure employed was 'house-to-house' lasting for 15 days (1 to 15 August), with all the information referring to the situation of the individuals at the census moment or within a defined period up to the census moment. Like the 1980 PC, the 1997 PHC combined *de jure* and *de facto* systems of enumeration. People were classified into three categories: (i) present resident *(residente presente),* those who were physically at their usual residence on the night of the Census, irrespective of their physical presence at the actual day of enumeration; (ii) absentees *(residente ausente)*, those who were not at their usual residence on census day; and (iii) visitor *(visitante),* those who were not usual residents in the household they were in at the census moment. People who were absent from the household for up to six months were included in the enumeration as absentees. This study uses the *de jure* population, that is, present residents plus absentees. The omission rate was estimated to be 5.1 per cent (INE 1998c:1). This was higher than in 1980 and was not estimated at provincial level.

(e) The 1997 Demographic and Health Survey

The Mozambique Demographic and Health Survey (DHS) was carried out between March and July 1997. Its main objective was to provide reliable, current information on fertility and reproductive behaviour, maternal and child health, infant and child mortality, contraceptive knowledge and use, and knowledge and attitudes regarding HIV/AIDS (Gaspar et al. 1998:xvii). The target population was all women of reproductive age, 15 to 49 years.

A probability proportional to size sample was designed in order to be representative at national, urban and rural, and provincial levels. The sampling was stratified by place of residence, rural and urban, and by province. The sample was selected in three stages. First, the census enumeration areas (100 to 200 households) were selected systematically with probability proportional to population size. Second, a complete list of households in each enumeration area (EA) was elaborated. And in the third stage, a number of households (which was determined according to population density of the EA) were selected in each enumeration area using a systematic sampling. The survey gathered information on 9,282 households, which included a total of 40,433 persons, 8,779 women of reproductive age, and 2,335 men aged 15 to 64 years (INE 1998a:1). The overall response rate was 96.8 per cent, with 96.1 per cent in urban areas and 97.0 per cent in rural areas (Gaspar et al. 1998:Table A.2).

2.2.3 Data evaluation

The estimates of fertility in this study are based on retrospective reports on children ever born and the reports of births occurring in the 12 months before the 1980 and 1997 censuses, reconstructed 1997 census birth histories and the birth histories from the 1997 DHS. The accuracy of these estimates depends on the completeness and accuracy of such reports. Retrospective information on children ever born can be affected by the omission of births and/or the inclusion of stillbirths, and the information on current fertility is often distorted by misperceptions of the reference period of one year.

This section assesses the quality of the reported ages of women and children, children ever born and births in the last year. This assessment is made not to correct the possible errors, but to identify the pattern of errors in order to have a better interpretation of the resulting fertility estimates. Because the information on age of male adults is not of use in this study, the evaluation of age misreporting is restricted to female adults and children under the age of 15. The age misreporting of children under 15 is discussed because of its relevance in the Own-Children method used to estimate fertility (see Chapter 3).

2.2.3.1 Reporting of woman's age

The accurate reporting of age of woman is important for the accurate estimation of fertility. However, in most censuses and surveys, especially among less educated populations, age is seriously misstated, distorting the resulting fertility estimates.

The main source of age misreporting is the inability of the respondent (or the head of household) to give her age. As has been argued, censuses and surveys in Africa 'share the problem of trying to record the ages of people who do not know their ages and are not fundamentally interested in knowing them' (van de Walle 1968:13). Many Mozambicans, particularly in rural areas, do not generally celebrate their birthdays and do not use age in their daily life. When the respondent is unable to report her age, it is obtained from a relative (usually the head of household) or is estimated by the enumerator, which can also be sources of error (Caldwell and Igun 1971; Gibril 1979; Ewbank 1981). Proxy reporting affects the quality of information on age because, as the information is given by a third person, in societies where one's age is not important, the ages of others may seem even less important (Ewbank 1981). The quality of the interviewers, which depends on their training, level of education, and their ability to understand and pursue the interests of the researcher, affects significantly the quality of the data (Gibril 1979; Ewbank 1981). A large proportion of age reporting errors arise through the interview process, and the exact causes of errors and their nature depend heavily on the specific characteristics of the population and the census or survey.

(a) Age heaping

One of the most notorious patterns of age misreporting is age heaping. Age heaping or age preference is a tendency of enumerators or respondents to report ages ending in certain digits (generally 0 and 5) at the expense of others. Many indices have been developed (e.g. Whipple, Myers and Bachi) to measure the extent of digit preference (Shryock, Siegel and Associates 1973; UNFPA 1993).

Table 2.1 Myers index by province and place of residence, Mozambique 1980 and 1997

Region/Province	Myers index			
	1980	1997		
		Total	Urban	Rural
Northern	**30.6**	**17.6**	**13.0**	**18.9**
Niassa	32.7	21.0	14.2	23.0
Cabo Delgado	32.5	17.5	13.0	18.5
Nampula	29.4	17.2	12.8	18.5
Central	**29.5**	**16.9**	**12.4**	**18.1**
Zambézia	31.5	17.0	13.4	17.5
Tete	27.8	17.9	12.6	18.8
Manica	28.3	15.6	12.5	16.7
Sofala	27.0	18.7	11.9	23.1
Southern	**19.0**	**11.4**	**8.8**	**13.8**
Inhambane	21.6	13.4	11.0	14.0
Gaza	19.7	13.2	11.1	13.9
Maputo Province	20.9	11.1	9.2	13.9
Maputo City	12.2	7.6	7.6	NA
Mozambique	**25.8**	**12.9**	**10.7**	**17.4**

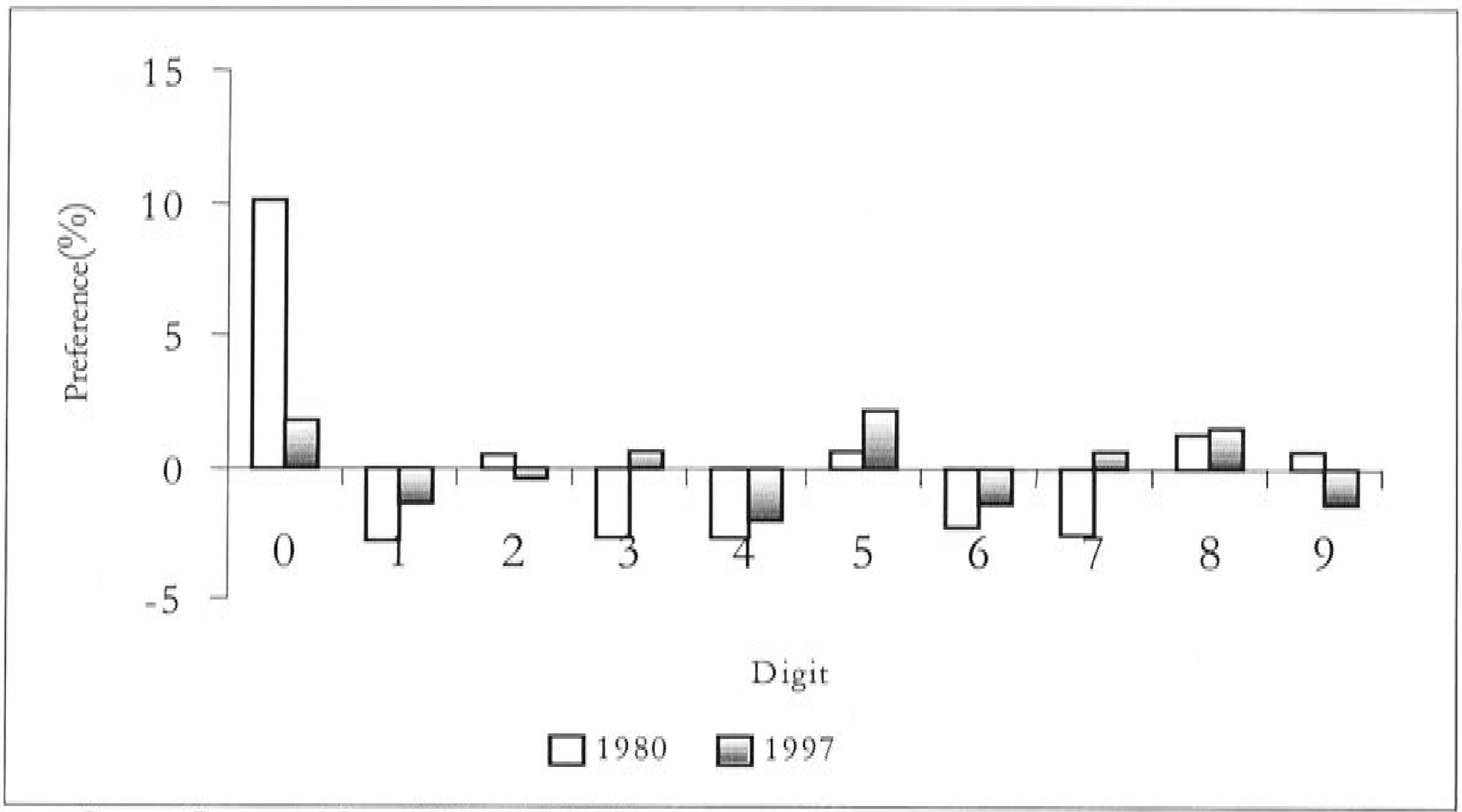
Note: Myers index ranges from 0 (no heaping at all) to 180 (all heaped on a single digit).
Source: Computed from 1980 and 1997 Censuses.

Myers's index (see Appendix B2.1 for a description) was used to measure the extent of age heaping in the 1980 and 1997 censuses of Mozambique. Although the method does not offer any means of correction, it helps to show the extent to which data are distorted by digit preference, and more importantly, the degree to which the distortions differ across regions and provinces. The results are shown in Table 2.1.

The analysis of age data from the two censuses shows that both are distorted by digit preference. Myers scores of less than 10 have been classified as a low level of digit preference, scores of 10 to 20 as a moderate level of digit preference, and scores above 20 as a high level of digit preference (Rutstein and Bicego 1990:8). Using these criteria, it was found that in 1980 digit preference was high in the Northern and Central Regions and moderate in the Southern. In 1997 the majority of provinces fell in the moderate category, with the exception of Niassa and Sofala (rural) which were in the high category, and Maputo City and Maputo Province (urban) in the low category. Age heaping in both censuses was lower in the Southern Region than in the Central and Northern Regions. These regional differences are probably explained by differences in the level of education between regions and provinces, since age heaping is more pronounced among populations with low education as they are less likely to report their ages accurately (Shryock et al. 1973). The Myers index of digit preference in 1997 was 18.9 for uneducated women, 12.6 for women with primary education and 8.9 for those with secondary education. As discussed in Chapter 1, the Southern Region has much higher literacy rates and the improvement in women's education between 1980 and 1997 was greater than in Central and Northern Regions. The educational differences may also explain the relatively low levels of age heaping in urban areas compared with rural areas.

The preference by digit (Figure 2.1) indicates that in 1980 the most preferred digit was 0 and the digits 1, 3, 4, 6, and 7 were avoided. In 1997, 5 was the most preferred and was joined by 0, 7 and 8, while 1, 4, 6 and 9 were avoided. The preference for ages ending in digit 7 in 1997 may be the result of preference for year of birth ending in 0 rather than the preference for digit 7 itself. Although the question asked was '*How old are you?*' (age at last birthday), in the probing process to determine the age of those who were unable to report by themselves (or without enumerators' help), the enumerators estimated the year of birth instead of age at last birthday. This led to a heaping in ages ending in 7. The absence of an official calendar event list may have contributed to enumerator-led errors. The pattern of digit preference does not vary across regions and provinces (see Appendix Figure B2.2.1), although there are some differences in their levels. Overall, zero preference diminished considerably from 1980 to 1997, while preference for digits 2, 3, 7 and 9 changed direction, mainly owing to mixed age and year of birth preference.

Figure 2.1 Myers Preference for specific digits, females, Mozambique 1980 and 1997



Source: Computed from 1980 and 1997 Censuses

Myers method, as well as Whipple's and Bachi's methods, were designed to measure digit preference but other errors may look like digit preference. Age distortion may also be due to other errors such as underreporting and non-reporting. Furthermore, it is very difficult to measure digit preference precisely, because the methods fail to make a distinction between errors due to digit preference, other errors, and real fluctuations of the population (Shryock et al. 1973).

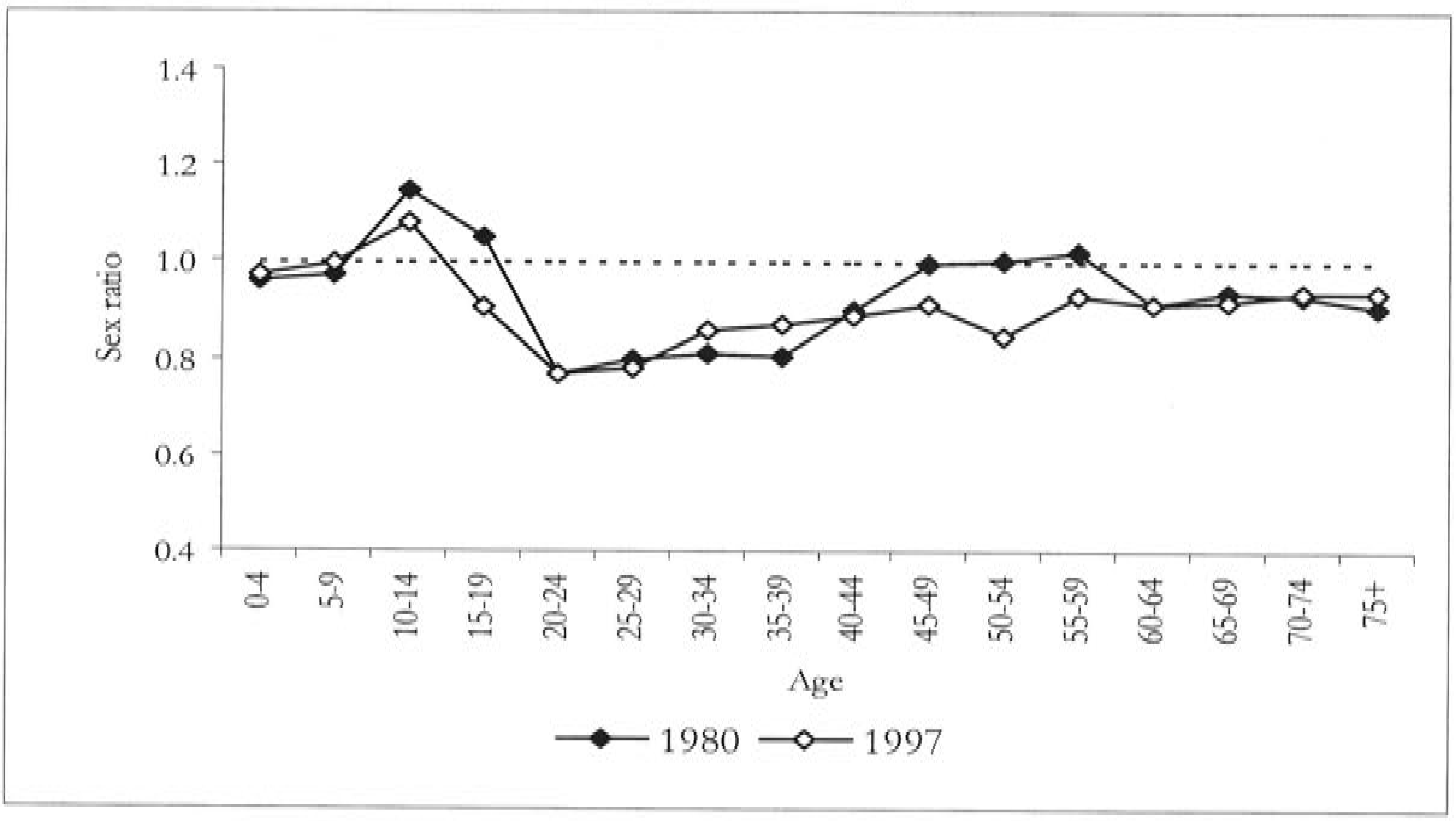
(b) Sex and age ratios

Sex ratios

Another way of detecting age misreporting is to examine age-specific sex ratios of the enumerated population. Fluctuations in sex ratios are an indication of differential errors between the two sexes. The problem with this approach, however, is that deviations in sex ratios can be due to several causes, which include age misreporting and other factors such as sex-selective under- or over-reporting and migration. The distinction between deviations due to age misstatement and those due to other factors cannot be made (Ewbank 1981).

Figure 2.2 shows sex ratios computed from the 1980 and 1997 Censuses. These ratios are around 1 in the first two age groups, peak at age 10 to 14 and decrease to lowest value (0.8) between 20 and 40 years. From this age the 1980 sex ratios increase to values just above 1 between 45 and 60 years, decreasing to values below 1 at older ages. The 1997 ratios remain at values below 1, but with less fluctuation. This pattern has been previously reported in Africa (van de Walle 1968; Ewbank 1981; Economic Commission for Africa 1988; UNFPA 1993). The peak at 10-14 suggests too many boys or too few girls. This may possibly be due to a tendency to exaggerate the ages of girls aged 10-14 if they have passed puberty and to understate the ages of those who have not reached puberty (UNFPA 1993). Ages of females are frequently estimated by their physical maturity, their marital status or their parity, and there is a quasi-universal tendency to assume a higher 'typical' age of marriage than actually prevails (van de Walle 1968). This results in a net upward bias in the reported ages of young married women and young mothers. Early first marriage and first birth, particularly in Central and Northern Regions, contributed to this error. In fact, the peak in the sex ratio at age 10-14 is more pronounced in Central and Northern Regions than in Southern Region (see Appendix Figure B2.2.2).

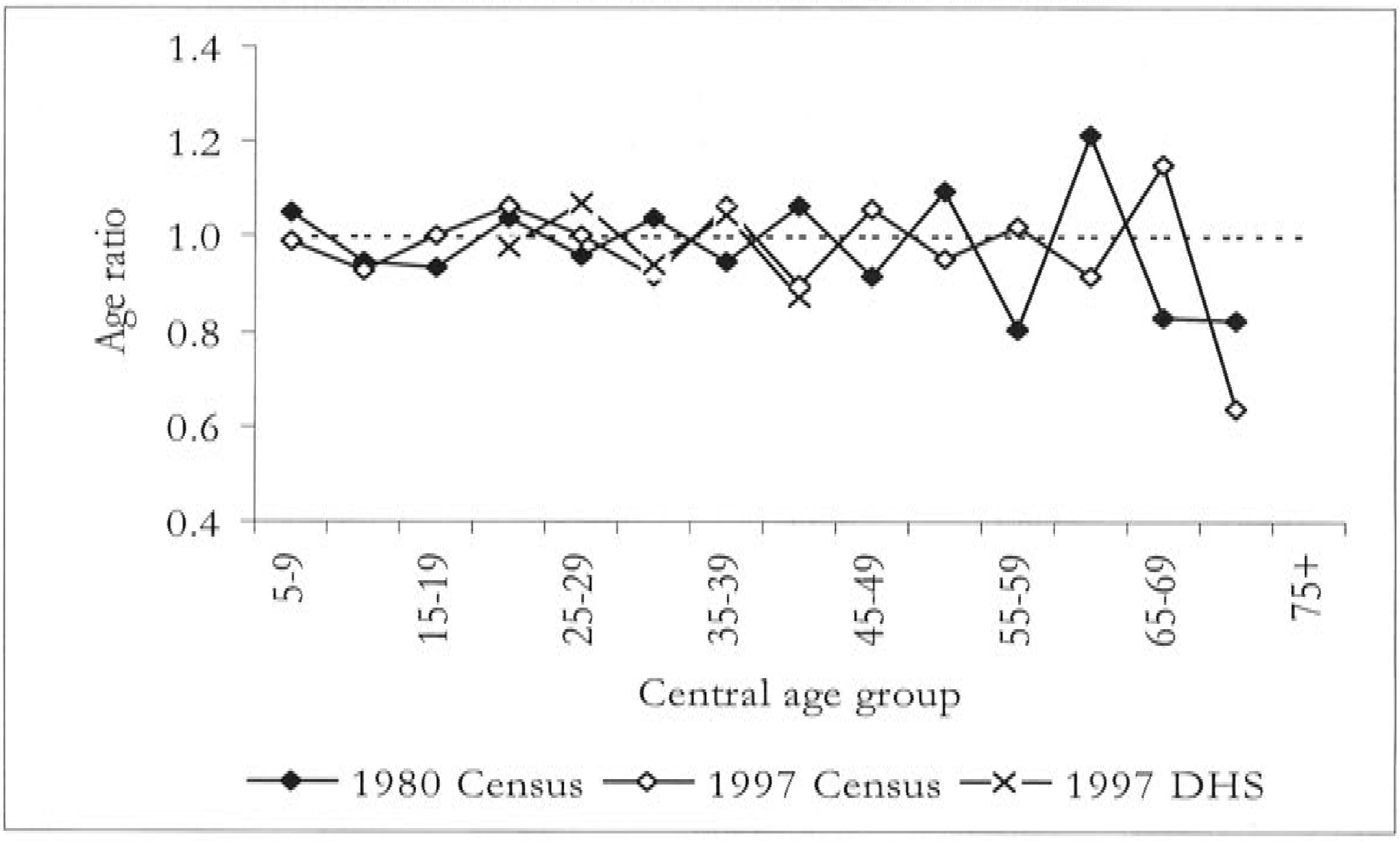
Figure 2.2 Sex ratio by age, Mozambique 1980 and 1997



Source: Computed from 1980 and 1997 Censuses

The relative shortage of males at reproductive ages is probably due to a combination of age exaggeration by males, omission of males because of their mobility or migration, and high male mortality in the war years. However, if high mortality of males had a big impact on the pattern of sex ratios this should be more pronounced in 1997 than in 1980 since the war was intense after 1980. This is not the case. Also, there may be age exaggeration of females aged 40 and over either due to enumerators' tendency to overestimate the age of women in their forties in order to avoid asking additional questions on fertility, or due to their physical appearance. This may explain why sex ratios do not decline at old ages as expected owing to sex-differential mortality. The effect of male migration is clearly evident in the Southern Provinces of Inhambane, Gaza and Maputo Province where there has been male labour migration to the mines of South Africa (United Nations 1981). Apart from migration to South Africa, there is significant male migration to Maputo City, particularly from Inhambane and Gaza provinces. This explains the different patterns of sex ratios in Maputo City (Appendix Figure B2.2.2), characterised by high sex ratios in adulthood, compared with other provinces. The increasing ratios with age in some provinces (e.g. Nampula and Zambézia) suggests age exaggeration by males.

Figure 2.3 Female age ratios, Mozambique 1980 and 1997



Source: Computed from the respective sources.

Age ratios

Age ratios are defined as the ratio of the population in a given age group to one-third of the population in the age group itself and the preceding and following groups. In the absence of age misreporting they are expected to be approximately 1, but they may deviate substantially even where reporting of age is good, because of real disturbances in the population caused by war or migration (Shryock et al. 1973). The assumption of an expected value of 1 also implies that coverage errors are about the same from age group to age group and that age reporting errors for a particular group are offset by complementary errors in adjacent age groups.

Figure 2.3 shows some fluctuations in age ratios as a result of digit preference. The fluctuations are more severe at older ages because older women are less educated and hence less likely to correctly report their ages. But this is not important for fertility estimation since P/F ratio and Relational Gompertz Model methods only use information from women 15 to 49, and in the own-children method (which uses women up to 64 years of age) the misreporting of women's age introduces relatively little bias (Cho, Retherford and Choe 1986). The age ratios from the 1997 census fluctuate slightly less than those from the 1980 census, which indicates better reporting in 1997. However, in the Northern Region the ratios fluctuate less in 1980 than in 1997, especially for young adults (see Appendix B2.2.3).

Table 2.2 United Nations age-sex accuracy index by province and place of residence, Mozambique 1980 and 1997

Region/Province	1980 Census	1997 Census		
		Total	Urban	Rural
Northern	**59.2**	**52.3**	**37.7**	**59.5**
Niassa	60.9	52.2	42.9	58.0
Cabo Delgado	57.4	49.9	38.0	54.9
Nampula	62.7	54.8	38.9	63.3
Central	**54.2**	**40.0**	**38.0**	**43.7**
Zambézia	62.2	50.1	48.0	52.9
Tete	44.2	36.2	37.2	40.0
Manica	65.4	44.8	44.1	49.5
Sofala	54.0	37.8	34.2	47.6
Southern	**51.0**	**32.6**	**29.3**	**39.1**
Inhambane	61.2	37.6	33.9	40.5
Gaza	50.5	38.1	35.1	40.4
Maputo Province	57.3	33.7	33.4	37.8
Maputo City	56.2	33.9	33.9	-
Mozambique	**46.3**	**33.9**	**30.2**	**41.7**

Source: Computed from 1980 and 1997 Censuses.

The United Nations Age-Sex Accuracy Index

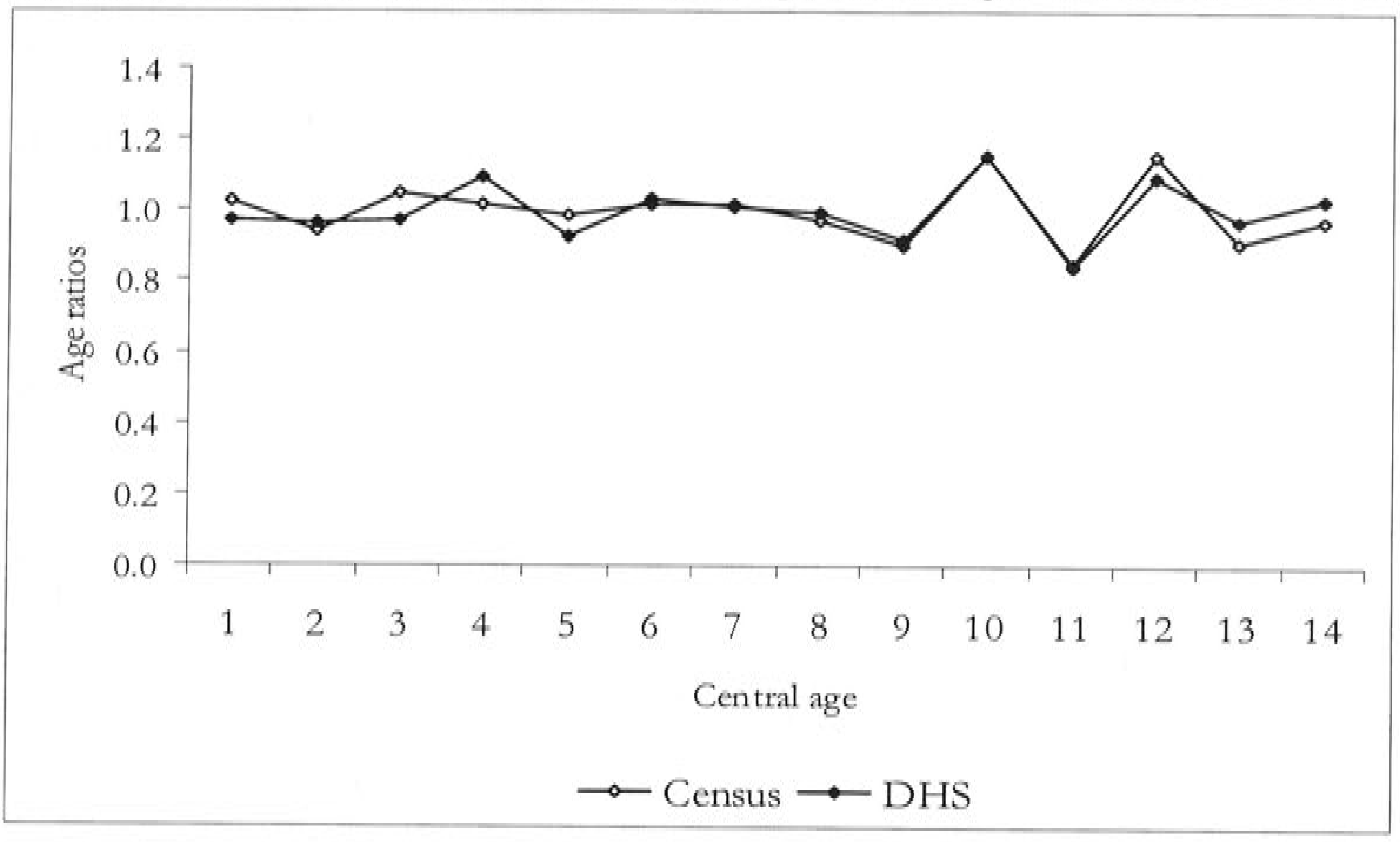
The United Nations Age-Sex Accuracy Index (see Appendix B2.1 for a description), which combines age and sex ratios, was also computed from 1980 and 1997 data and the results are shown in Table 2.2. The United Nations classify the index as 'accurate', 'inaccurate' or 'highly inaccurate' if it is under 20, 20 to 40, or over 40, respectively. Data from the 1980 Census can be classified as highly inaccurate as the UN index is greater than 40 in all provinces. In 1997 also, the majority of the provinces have highly inaccurate data. However, there was a slight improvement over time. The data from the Southern Region can be classified as inaccurate, while in Central and Northern Regions only Tete, Sofala, and the urban areas of Nampula and Cabo Delgado appear to have inaccurate data. Although the regional pattern is consistent with the results from the other methods, some provinces (if not all) may have their UN index inflated by internal migration. There is significant interprovincial migration that can bias the index. In fact, the regional indices (for regions as whole) are lower than the provincial ones, which indicates the existence of migration between provinces within regions.

2.2.3.2 Reporting of the age of children under 15 years old

The quality of the reporting of age for children under 15 years is assessed for the 1997 Census only, since the Own-Children Method was only applied to this census. The data were evaluated by examining age ratios centred on single years of age. Deviations of age ratios from 1 should be regarded as evidence of age heaping unless they can be traced to specific historical events that could have influenced the annual number of births (Arnold 1990). However, small deviations may be caused by real fluctuations in births.

Figure 2.4 shows age ratios centred on single years of age for the 1997 Census and 1997 DHS. Since the census and the DHS were conducted only three months apart (on average), in the absence of differential reporting errors, the age ratios should exhibit a similar pattern. In both census and DHS the age ratios fluctuate significantly indicating the presence of age heaping due to digit preference, especially at older ages. However, other factors may also explain the slightly higher values of age ratios centred on age 3 in the 1997 census compared with adjacent ages. It could be that enumerators used the first democratic elections held in 1994 as a historic event to estimate children's age, resulting in a high number of children reported as being born in this year. The DHS data do not show ratios greater than one at age 3, but high ratios at age 4, which suggest that in the DHS interviewers may have displaced births that occurred three years before the survey to four years in order to avoid asking the additional questions on fertility planning, health and breastfeeding (Arnold 1990, 1991; Blacker 1994). The cut-off age below which these questions were asked was 3 years old, and interviewers who wanted to decrease their workload may have been inclined to change the birth dates of selected children so that the children would not be included in those sections of the questionnaire (Arnold 1990). This is particularly likely to have occurred if the respondent was unable to give the exact date of birth for all her children.

Figure 2.4 Age ratios centred on single years of age, Mozambique 1997 Census and DHS



Source: Computed from 1997 Census and DHS.

2.2.3.3 Reporting of children ever born and births in last year

(a) Reporting of children ever born (CEB)

Biases in parity data arise mainly from omission (or under-reporting), over-reporting and the classification of zero parity women as parity 'not stated'. Omission occurs when women (or persons responding on their behalf) fail to report all the children they have borne. Children who have died shortly after birth, those who have already left the home or were fathered by other men are more likely to be omitted (Blacker and Brass 1979; Brittain 1991; Brass and Rashad 1992; Chidambaram et al. 1992). It is believed that the probability of omission is related to the characteristics of the respondent such as age and education. Older women may fail to report some of their children because of lapse of memory or, if ther are uneducated, because of difficulty in counting large numbers. Another problem with CEB data is over-reporting or 'faulty inclusions' (Blacker and Brass 1979:49). This occurs when adopted children, children born to the woman's husband by another wife, grandchildren and stillbirths are reported as CEB (Chahnazarian 1988). Omissions and faulty inclusion can be minimised by splitting the question on parity into three parts: children living with the respondent, those living elsewhere, and those who have died (United Nations 1983). Unfortunately, parity information from both censuses used in this study was obtained by a single question, which may have increased the chance of omission.

Table 2.3 Reported average parity from various sources, Mozambique 1980 -1997

Age Group	1980 Census	1997 DHS	1997 Census
Mozambique			
15-19	0.497	0.366	0.400
20-24	2.029	1.592	1.634
25-29	3.306	2.955	2.912
30-34	4.537	4.068	4.123
35-39	5.200	5.314	5.010
40-44	5.569	5.985	5.664
45-49	5.589	5.640	5.850
Northern Region			
15-19	0.599	0.546	0.567
20-24	2.122	1.769	1.928
25-29	3.292	3.232	3.143
30-34	4.291	4.434	4.242
35-39	4.801	5.539	5.017
40-44	4.983	5.840	5.560
45-49	4.945	5.065	5.695
Central Region			
15-19	0.541	0.390	0.406
20-24	2.216	1.741	1.683
25-29	3.614	3.065	3.044
30-34	5.114	4.145	4.375
35-39	5.943	5.587	5.268
40-44	6.456	6.084	5.994
45-49	6.556	6.397	6.232
Southern Region			
15-19	0.336	0.252	0.235
20-24	1.650	1.248	1.174
25-29	2.845	2.523	2.341
30-34	3.965	3.705	3.597
35-39	4.677	4.606	4.616
40-44	5.078	5.990	5.342
45-49	5.125	5.688	5.541

Sources: Computed from the respective sources.

Table 2.3 shows the average parities by age of women according to the two censuses (1980 and 1997) and the 1997 DHS. The mean parities do not increase with age of woman after the age of 35, and in some cases (Mozambique 1997 DHS; Northern Region 1980 and 1997 DHS; Southern Region 1997 DHS) the average parity of women 40-44 is higher than the parity of women 45-49, suggesting greater omission by the women in the last age group. Unless fertility has been rising the failure of mean parity to increase with age of women is an indication of omission of CEB by older women (United Nations 1983). For the younger ages the average parity appears to be fairly well reported in all data sources.

The comparison of the two censuses shows that average parity in 1997 is less than in 1980 at young ages, which indicates that fertility had decreased. However, at older ages, except for the Central Region, parity is higher in 1997 than in 1980, suggesting a higher degree of omission of CEB by older women in 1980, if fertility had not increased. In the Central Region, parity in 1997 is lower than parity in 1980 at all ages (Table 2.3), which may indicate that fertility decreased and that the reporting of CEB by older women was fairly good in both censuses. The fact that the average parity at older ages (35 and over) is higher (except in the last age group for Mozambique and the Northern Region) in the DHS than in the census suggests better reporting in the former than in the latter.

Table 2.4 Sex ratios of reported children ever born by age group of mother and province, Mozambique 1997

Region/Province	Age of woman							
	15-19	20-24	25-29	30-34	35-39	40-44	45-49	Total
Northern	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**0.99**	**1.00**
Niassa	1.00	0.98	0.99	0.99	0.99	0.97	0.99	0.99
Cabo Delgado	0.98	1.00	1.00	1.00	0.99	0.99	0.97	0.99
Nampula	1.00	1.00	1.00	1.00	1.00	1.01	1.00	1.00
Central	**1.01**	**1.01**	**1.01**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**
Zambézia	1.01	1.01	1.01	1.00	1.00	0.99	1.00	1.00
Tete	1.01	0.99	1.00	1.00	1.00	1.00	0.98	1.00
Manica	1.02	1.01	1.01	1.01	1.01	1.00	1.01	1.01
Sofala	1.00	1.01	1.01	1.00	1.01	1.00	1.01	1.01
Southern	**1.00**	**1.01**	**1.01**	**1.00**	**1.00**	**1.00**	**0.99**	**1.00**
Inhambane	1.01	1.00	1.00	1.00	0.98	0.99	0.99	0.99
Gaza	1.01	1.00	1.01	1.01	1.00	0.99	0.99	1.00
Maputo Province	0.97	1.00	1.01	1.00	1.00	1.00	1.00	1.00
Maputo City	0.98	1.01	1.01	1.00	1.01	1.00	1.00	1.00
Mozambique	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**0.99**	**1.00**

Source: Computed from 1997 Census.

The quality of the reporting of CEB can also be assessed by the computation of sex ratios of children ever born by age of mother. These sex ratios are not expected to vary systematically with age and should be between 1.02 and 1.07 (United Nations 1983:76-77). Sex ratios outside this range may suggest differential omissions by sex and/or mis-reporting of the sex of the reported CEB. However, it has been argued that sex ratios at birth for the black population may be below those for the white (van de Walle 1968;

Shryock et al. 1973). The analysis of the United States 1960 Census (Shryock et al. 1973:Table 8-14) found that sex ratios at birth for the black population were lower than for the white population. As shown in Table 2.4, the sex ratios for the 1997 Census of Mozambique range from 0.97 to 1.02, which is outside the usual range (1.02 – 1.07). There is little variation of sex ratios according to age of mother, but in some provinces (for example Niassa and Cabo Delgado) the sex ratios appear to decrease slightly with age of mother suggesting a sex-selective omission by older women. It could be (if women omit dead children) that boys are increasingly more likely to be omitted than girls as age of woman increases, since mortality is higher for males than for females. Overall, the sex ratios do not show great distortion of CEB data for 1997. Unfortunately, CEB by sex are not available from the 1980 census where the omission seems more severe than in 1997.

The information on CEB can also be affected if the parity of a sizeable proportion of women is not stated. Not stated is more common when enumerators tend to leave a blank space or fill in a dash when recording CEB in cases where the true number is zero, and at the processing stage it is interpreted as non-response, causing a net transfer of women from zero parity category to not stated category (El-Badry 1961). El-Badry proposed a procedure that permits the estimation of the proportion of women classified as not stated who are zero parity. This method is based on the observed high correlation between the proportion childless and proportion with parity not stated, and it is applied only if this relationship holds. The information on women with parity not stated was not in the data, and, therefore, it was not possible to examine whether the El-Badry correction was appropriate.

The 'not stated' bias can influence the results of the present study, especially the estimates of fertility in Chapter 3 and the analysis of infertility in Chapter 7. It may underestimate the number of childless women, if some childless women are recorded as with parity not stated. It can also inflate the average parity, if women with parity not stated are removed from the denominator, and deflate the average parity if they are included in the denominator.

(b) Reporting of births in last year

Errors in the reporting of births that occurred during the year before the census or survey are mostly related to the misperception of the reference period (one year). Women may report births that occurred in a period shorter or longer than a year (Brass and Coale 1968;

Brass 1975; United Nations 1983). If a shorter period is considered the births are under-reported, and if a longer period, the births are over-reported. This bias is believed to be independent of woman's age (Brass and Coale 1968). The question asked (in both censuses) was '*During the last 12 months how many live born children did you bear?*'. This kind of question tends to be subject to larger reference-period error than a question about the date of the last live birth (Cleland 1996; Collumbien, Timæus and Acharya 1997).

2.2.4 Synthesis of quantitative data evaluation

The first part of this chapter discussed the source and quality of quantitative data. Both the 1980 and 1997 censuses and the 1997 DHS data have errors but they are not too severe to preclude the use of indirect techniques. The major distortions in the data are due to age misreporting (mainly digit preference and age exaggeration) and omission of children ever born. Older women had much poorer reporting of age than younger ones, but this will not affect fertility estimates, since the information for older women is not used in the estimation, except in the own-children method where the effect is reduced. The reported ages of children under 15 years are affected by digit preference. There is also over-reporting of children aged 3 years, which may have been caused by the use of the first democratic elections held in 1994 as a reference event in estimating the age of children.

The children ever born data are distorted by omission, which increases with age of woman, especially in 1980. However, the analysis of sex ratios of the reported children ever born did not show great fluctuations, giving no evidence of sex-selective omission of children ever born.

All the analyses and methods applied showed that the quality of reporting of both age and CEB was better in 1997 than in 1980. It was also clear that Southern Region has much better reporting than Northern and Central Regions. This is not surprising since the level of education, which is positively related to better reporting, is higher in Southern Region than in Northern and Central Regions.

2.3 Qualitative sources

Qualitative methods have been increasingly used in demographic research (Knodel 1997; Obermeyer 1997; Coast 2001; Yoder 2001), reflecting an awareness of the importance of multidisciplinary collaboration for analysing demographic issues (Obermeyer 1997:813). In her review of the use of ethnographic texts by demographers, Coast (2001) found that these texts were mainly used to provide context to the research or to corroborate the research conclusions. According to Knodel (1997:850-852), qualitative data in demography can be used for three purposes: to confirm or contradict survey results; to allow the researcher to gain a fuller understanding of the meaning of survey findings; and to contribute to finding an explanation for some of the relationships being studied.

In this study, qualitative data are used to identify important cultural and behavioural patterns that can help in explaining fertility differentials. Thus, qualitative information (ethnographic and anthropological literature, and fieldwork data) is to complement, rather than replace quantitative data. As noted by Svetsreni and Attig (1993:66), 'The ideal objective is to combine both the qualitative and quantitative information in order to get a more holistic and comprehensive picture about the people and the problem under study'.

Similarly, Kertzer (1997) argues that a full explanation of demographic behaviour cannot be done by quantitative approach alone.

> How and why people acted as they did, how they came to change their behavior, and of course the impact of these changed demographic behaviors on other aspects of their lives and on larger social institutions and social interactions - these can only be understood in terms of a complex web of relationships involving cultural norms, social structure, political power, and economic relations (Kertzer 1997:839).

Combining quantitative and qualitative methods allows the researcher to interpret statistical results in the light of the social and cultural environment of the population under study. This is because qualitative methods allow more elaborate answers to be expressed than the typical survey, providing more insights into the phenomenon under investigation and contributing significantly to its explanation (Knodel 1997:851).

2.3.1 Ethnographic and anthropological literature

One source of qualitative data used in this thesis is the body of ethnographic and anthropological literature. A significant number of ethnographic and anthropological studies about many of the Mozambican socio-linguistic groups have been identified. These studies provide valuable information on cultural aspects that can be of use in understanding demographic behaviour; they include monographs, books by missionaries, honours theses in history at the Eduardo Mondlane University and doctoral theses in anthropology.

The monographs were written in the colonial era as a requirement for promotion of the Portuguese administrative staff. They describe social aspects of interest for the present study: marriage, childbearing, breastfeeding, sexual abstinence and infertility. They also provide wide coverage of the cultural diversity in the country; however, they are out of date. More elaborate and recent are honours and doctoral theses, but they cover only selected socio-linguistic groups: the Tsonga, Lomwe and Macua. No study of this nature was identified for the Sena/Ndau group.

2.3.2 Primary (fieldwork) data

The second source of qualitative data is primary data collected through five months of fieldwork, from December 2000 to May 2001, conducted in Southern Mozambique. The methods of collection were focus group discussion (FGD), in-depth interview (IDI), 'informal interview' and participant observation. Focus group discussions were mainly employed to collect group norms or attitudes on marriage, childbearing, fertility control, infertility, breastfeeding, and postpartum sexual abstinence. Encouraged by the moderator, the FGD participants discussed one or several topics in ways that revealed their experiences (Yoder 2001:9). In-depth interviews were used to collect individual experiences relevant to the topic under study. In these, the interviewer pursued a particular theme in further detail and elicited more extensive comments from the interviewee about the issue (Yoder 2001:8). Combining FGDs and IDIs allowed the author to gather information on group norms as well as information on individual experiences, and allowed consistency checks.

2.3.2.1 Fieldwork preparation

(a) Guideline development

The preparation for fieldwork was undertaken in Canberra, from August to November 2000, with the development of the guideline questions for both FGDs and IDIs (see Appendix B2.3). These guidelines were first written in English but later translated into Portuguese, and again into Xitswa, the language of the target population. The guidelines included open-ended questions on social aspects of the reproductive process such as breastfeeding and postpartum sexual abstinence, marriage, attitudes towards infertility and polygyny, and fertility regulation. The guideline questions were pre-tested in Canberra, Maputo and Inhambane City. In Canberra the pre-test was with four Mozambican students at The Australian National University and the wives of two of them; in Maputo the participants were final-year undergraduate Geography students at Eduardo Mondlane University. In Inhambane City the participants in the pre-test included staff members of the provincial delegation of the National Institute of Statistics and of the Provincial Training Centre for Women.

(b) Recruitment and training of research assistants

Three research assistants, one male and two females, were selected in Inhambane City with the assistance of the Provincial Delegation of the National Institute of Statistics. Candidates were to have completed pre-university studies, be fluent in both Portuguese and Xitswa, and have interviewing experience. However, because no candidate with the required qualifications had experience in conducting interviews, candidates in the final year of pre-university studies but with good interviewing experience were preferred to those with the qualifications but no experience.

The author trained the research assistants for one week. The Training Manual (prepared by the author in Maputo) and the FGD and IDI guidelines were the main material for training. The manual defined the important concepts of the study; the objectives of the study; how to moderate a FGD; how to conduct an interview; how to gain the confidence of the respondent; how to be neutral during the interview; how to ask sensitive questions and how to handle difficult answers.

During the training three pilot FGDs and two IDIs were conducted and transcribed. This was very important because although all the research assistants had conducted interviews before, none had collected qualitative data. This was evident from the first pilot interviews when they experienced some difficulties in dealing with open-ended questions. However, after intensive training, their performance improved markedly. To assist the research assistants, after listening to the tapes, the author elaborated and discussed a list of possible additional questions for each answer.

(c) Selection of fieldwork area

Initially, three provinces had been selected: Nampula, Sofala and Inhambane. These provinces had been chosen in order to cover all the three administrative regions, Northern, Central and Southern, and the major ethnic-linguistic groups, the Macua (Nampula), Sena/Ndau (Sofala) and Tsonga (Inhambane). According to the 1997 census these three ethnic-linguistic groups accounted for about 60 per cent of total population. In selecting these provinces, both the matrilineal and patrilineal systems of social organisation that are found in Mozambique would be included.

However, two factors prevented the data from being collected in Nampula and Sofala. The first factor was the lack of funding. While still in Australia, the author contacted the director of 'Projecto MOZ/98/P08', a project in the Population Studies Centre (CEP) at Eduardo Mondlane University funded by UNFPA, asking for financial assistance for fieldwork and was assured that the proposed budget would be covered. However, only a third of the budget was covered. Secondly, the serious floods that affected the Central and Northern Regions, from late January to March 2001, affected the selected provinces of Nampula and Sofala, preventing the fieldwork from being conducted in those provinces. Under these circumstances the fieldwork was only conducted in the Southern province of Inhambane. The choice of Inhambane among the Tsonga speaking provinces was made in order to cover the Tsonga whose dialect is Xitswa. This is because most of the anthropological literature about the Tsonga covers those who speak the other two dialects, Xichangana and Xironga (see Rita-Ferreira 1968; Junod 1974; Feliciano 1998; Loforte 2000). The data were collected in Homoine district. This district was randomly selected among nine districts where Xitswa is spoken. Five districts, Maxixe, Inhambane, Jangamo, Inharrime and Zavala, were left out of the sampling frame because their populations are not Tsonga.

2.3.2.2 Data collection

(a) Focus group discussions

The discussants in the focus groups were chosen from four randomly selected Administrative Posts or Localities, Mbenhane, Nhaulane, Pembe and Homoine-Sede. The FGDs took place at the headquarters of each Administrative Post or Locality, except in Homoine-Sede where they took place in the Hospital courtyard and the participants were women going for antenatal or postnatal care and accompanying relatives. In other localities the participants were selected among the villagers. Because the population is sparse local authorities were contacted two or three days in advance and asked to invite people to headquarters where a random selection was made. At the end of the sessions the participants, as well as those who were left out in the random selection, were presented with refreshments or alcohol. This kind of compensation is common in qualitative research: small gifts not only compensate subjects, but also express sincere thanks for their time and effort, which might very well have been spent in more economically valuable pursuits (Sirirassamee 1993:62). In all localities people were happy to take part in FGDs.

The FGDs were conducted separately for females and males, and also combining the two sexes. The combined FGDs enriched the discussions for general issues but impoverished them in more sex-specific issues. Most men and women (especially women) would not talk about more 'masculine' or 'feminine' aspects of sexual behaviour while discussants or members of the research team of the opposite sex were present. For example, when the moderator in a mixed FGD asked the participants to specify ceremonies in which infertile women are not allowed to participate, as women were reluctant to speak, a male participant said that women would not specify while men were present.

All FGDs were conducted in Xitswa. One female research assistant moderated the FGDs with women and the other female research assistant was a note-taker. The author moderated one FGD of mixed sexes, and the male research assistant moderated the remaining mixed and male FGDs. Both male and female research assistants turned out to be excellent moderators. The author did not moderate all the mixed-sex and male FGDs to avoid 'leading questions bias'. If the moderator and the project director are the same person, he (the moderator)

> can very easily ask leading questions which will bias the way in which group members answer questions. He can also direct questions to persons he feels will give him the answer he wants to hear. Hence, the person who is assigned to evaluate and analyze the data should be someone who is neutral in terms of advantages or disadvantages. (Boonchalaksi 1993:55).

Despite not moderating most of the sessions, the author participated closely in the discussion process as either a note-taker or an observer. However, this was only done for the male and mixed sessions, because the author's presence in the female sessions could inhibit women from talking more freely about female biological aspects of the reproductive process.

All FGDs were tape recorded, with the consent of the respondents, and fully transcribed by the members of the research team. The transcriptions took place in the field immediately after each session, so that the next session could only occur after the previous one had been completely transcribed. This had two important advantages: it allowed the researcher to detect and incorporate emergent themes that needed more probing in the next session; it also allowed the researcher to identify the possible moderating and interviewing errors that needed to be corrected for the next session.

Seven FGDs of 5 to 13 participants each were organised. In total, 56 participants were involved, 45 per cent males and 55 per cent females (Table 2.5). Their ages ranged from 20 to 77 years (24 to 77 for males and 20 to 67 for females). In terms of education, 32 per cent of the participants had no education, 47 per cent had primary education, and only 21 per cent had secondary education or higher. As expected, male and young participants were on average more educated than female and old participants, respectively.

Table 2.5 Participants in focus group discussions by socio-economic characteristics, Inhambane Province 2001

	Education (%)			Marital Status (%)		No.
Category	None	Primary	Secondary	Married	Widowed	Cases
Males	5	71	24	100	0	25
<40 years old	0	40	60	100	0	9
40 + years old	6	81	13	100	0	16
Females	54	27	19	81	19	31
<40 years old	31	38	31	85	15	15
40 + years old	77	15	8	77	23	16
Total	32	47	21	89	11	56

Source: 2001 Inhambane Qualitative Data

(b) In-depth interviews

Five in-depth interviews were conducted. The two male respondents were selected from focus groups sessions and three female respondents were selected among the villagers whose occupation or personal experiences are related to reproduction. This selection was made through informal conversations between the author and the villagers.

The female research assistant conducted the interviews with female respondents while the author interviewed the male respondents. The interviews were conducted either in respondents' homes or in their offices to ensure that no interruptions or other disturbances would occur during the interviews. The characteristics of the respondents are shown in Table 2.6. These interviews allowed the researcher to obtain deeper and more detailed information on social aspects of reproduction and to clarify some aspects that could not be clarified in the focus group sessions.

Table 2.6 In-depth interview respondents' characteristics, Inhambane 2001

	Sex	Age	Marital Status	No. of Children	Education	Occupation
A	Male	77	Married	3	Primary	Traditional Leader
B	Male	58	Married	4	Secondary	Cook
C	Female	39	Widow	6	Primary	Midwife
D	Female	31	Married	2	Secondary	Nurse
E	Female	55-65	Married	8	None	Farmer

Source: 2001 Inhambane Qualitative Data.

(c) Participant observation and 'informal interviews'

In addition to FGDs and IDIs, the information was also collected through participant observation and 'informal interviews'. 'Informal interviews' were informal conversations focusing on only one section of the guideline questions. The distinction between in-depth interviews and 'informal interviews' lies in the fact that the latter were short conversations (lasting no more that 40 minutes) and were not tape-recorded, although notes were taken. In all, 17 'informal interviews', 9 for males and 8 for females, were conducted.

Both participant observation and 'informal interviews' were important in clarifying certain issues that arose during the FGDs as well as putting into context certain past occurrences witnessed by the author. Since he grew up in the fieldwork area, the author has an understanding of some cultural aspects, and has participated in some reproduction-related ceremonies, for example, the marriage processes of relatives, including the negotiation and payment of bridewealth.

2.3.3 Limitations of qualitative data

The qualitative data used in this thesis do not cover all the major socio-linguistic groups. In order to assess the influence of cultural diversity on fertility and proximate determinants, it was necessary to cover the main ethnic-linguistic groups by qualitative data collection. However, as mentioned before, this did not happen because of funding problems and natural disasters. The significant anthropological literature about the social-linguistic groups not covered was mostly out of date and had little relevance for the analysis of changes.

It is possible that precision was lost through the two-step translation of the FGD and IDI guidelines and transcriptions. Three languages were involved in the process of data collection and analysis: English, Portuguese and Xitswa. Although the author speaks all these languages fluently, some important nuances in meaning may have been lost in the process of translation.

2.4 Analytical strategy

The quantitative analysis is conducted at two levels: individual-level and aggregate-level. The individual-level analysis considers women as units of analysis and the aggregate-level analysis takes a province as its unit of analysis. The objective of aggregate-level analysis is to investigate how the socio-economic characteristics of a province, measured by socio-economic indicators, influence the level of fertility (see details in Chapter 4).

Indirect techniques are used to derive the estimates of fertility levels and patterns. The choice of the techniques depends on the kind of data available and the data requirement and underlying assumptions of the techniques available. Thus, P/F Ratio, Relational Gompertz and Own-Children techniques for fertility estimation are used. Fertility trends are also assessed through the analysis of birth history data from the DHS by applying P/F Ratios for birth histories (Hobcraft, Goldman and Chidambaram 1982) and censored parity progression ratios (see details in Chapter 3).

Appropriate bivariate and multivariate methods of analysis are applied. Multivariate analyses are used to evaluate the effect of each of the independent variables on the dependent variables while controlling for the effect of the other independent variables. The selection of the method depends on the characteristics (whether they are numeric or categorical variables) of the independent and response variables. Thus, Poisson Regression Model (Chapter 4), Logistic Regression (Chapters 4, 5, 7, 8), Proportional Hazards Model (Chapters 5 and 6) and Multinomial Logistic Regression (Chapter 8) are used in the analysis of the effect of the cultural and socio-economic characteristics on fertility, nuptiality, duration of postpartum infecundability, infertility and contraceptive use. More details on these methods are given in the respective chapters and in Appendix A.

Chapter 3

FERTILITY LEVELS, PATTERNS AND TRENDS

3.1 Introduction

This chapter applies indirect methods to data from the 1980 and 1997 censuses and the 1997 Demographic and Health Survey, and examines national, regional and provincial levels, patterns and trends of fertility in Mozambique. It begins by applying, successively, the P/F Ratio, the Relational Gompertz Model and the Own-Children methods to these data to estimate the fertility levels and age-specific fertility rates (ASFR). The Own-Children method was applied only to the 1997 census to assess the trends in fertility during the 15 years before the data collection. The results are then discussed taking into account the underlying assumptions of the methods, as well as the effect of the reporting errors identified in the data evaluation in Chapter 2.

Fertility trends are assessed in four ways. First, by examining national fertility trends from 1950 to 1980, based on published estimates, and regional and provincial patterns of fertility change between 1980 and 1997 censuses. This is followed by a discussion of the Own-Children method results, which show national, regional and provincial trends in annual TFR from 1983 to 1997. Thirdly, the cohort-period age-specific fertility rates and the P/F ratios computed from the birth history data are analysed to assess fertility trends and data quality. Lastly, the assessment of fertility trends is completed by examining changes due to deliberate fertility control, using adjusted censored parity progression ratios computed from the 1997 DHS.

3.2 Estimation of fertility levels and patterns

In sub-Saharan Africa fertility is often estimated using indirect methods. These methods use demographic models to take into account the most probable source of errors and minimise their influence on the estimates. The use of models and plausible assumptions that are translated into clear mathematical relationships introduces order and consistency into the data, which are otherwise difficult to obtain (Muhwava and Timæus 1996:13). However, mathematical models may not always reflect reality and indirect estimation methods can themselves introduce bias if the underlying assumptions are violated (Brass 1996; Muhwava and Timæus 1996).

There are many indirect methods for the estimation of fertility but their applicability in a particular situation depends on the data requirements and the underlying assumptions. Here, the P/F Ratio, the Relational Gompertz Model and the Own-Children method are used. Further details about each are given in the following sections.

3.2.1 P/F Ratio method

The P/F ratio method (Brass and Coale 1968; Brass 1975; United Nations 1983) consists of the comparison of the reported CEB with current fertility (births in the year preceding the census or survey). However, this comparison is complicated by the fact that the two sets of information do not refer to the same ages. The average parities (Pi) calculated from data on CEB refer to the fertility experience at the midpoint of age intervals, while cumulated fertility (Fi) from current fertility rates represents the experience at the end-points of age intervals. A model is used to obtain cumulated current fertility referring to midpoints so that it is comparable with the average parity (Pi). For more details of the method see United Nations (1983:27-41). On the assumption of constant fertility in the recent past, the P/F ratios are expected to be 1.0 for all age groups. Divergence between P and F suggests the presence of fertility change and/or errors in reporting.

The information on CEB is frequently distorted by omissions, which increase with age of woman (Brass and Coale 1968; Brass 1975). On the other hand, current fertility is affected by the respondents' inaccurate perception of the reference period, but this error does not generally vary with age of woman. Assuming that the level reported by young women is correct and accepting the age pattern of current fertility, the P/F ratios from young women (20-24, 25-29, and perhaps 30-34) are used to adjust the level of current fertility.

There are many extensions and variants of the Brass method. Here, the Coale and Trussell variant is applied (United Nations 1983). The difference between the Brass original method and the variant from Coale and Trussell resides in the model used in obtaining the cumulated current fertility referring to midpoints. Brass used a simple polynomial model of fertility while Coale and Trussell fitted a second-degree polynomial using the Coale-Trussell model of fertility (United Nations 1983:33).

Table 3.1 P/F ratios by region, Mozambique 1980 and 1997

	Age groups						
Region	15-19	20-24	25-29	30-34	35-39	40-44	45-49
			1980 Census				
Northern	2.05	1.62	1.33	1.23	1.10	1.02	0.91
Central	2.04	1.69	1.38	1.33	1.21	1.16	1.06
Southern	1.83	1.55	1.28	1.22	1.14	1.10	1.02
Mozambique	2.00	1.64	1.34	1.27	1.15	1.10	0.99
			1997 Census				
Northern	1.65	1.31	1.18	1.14	1.09	1.08	1.02
Central	1.68	1.40	1.29	1.28	1.21	1.23	1.16
Southern	1.38	1.28	1.27	1.35	1.38	1.41	1.37
Mozambique	1.61	1.36	1.26	1.24	1.20	1.21	1.16
			1997 DHS				
Northern	0.91	0.96	1.05	1.04	1.12	1.00	0.79
Central	1.10	1.01	0.89	0.85	1.00	0.98	0.96
Southern	0.79	0.82	0.88	0.99	1.02	1.14	1.03
Mozambique	0.93	0.96	0.95	0.95	1.06	1.05	0.92

Source: Computed from the respective sources.

Table 3.1 shows the P/F ratios computed from the 1980 and 1997 censuses and 1997 DHS by region. The census-based P/F ratios are relatively large and consistently above 1.0 at all ages (except the last age-group for Northern Region and Mozambique in 1980) while the ratios from the DHS are around 1.0. The fact that the P/F ratios from the DHS are lower than those of the 1997 census suggests that there was an under-reporting of current births (that is, women reported births that occurred in a period shorter than a year) in the census but not in the DHS. The ratios from both censuses decrease with age[6], except for Southern Region in 1997, where the P/F ratios from both censuses increase slightly with age. For the DHS, only ratios for the Southern Region increase with age up to the age-group 40-44. For the remaining regions and national level, the ratios from the DHS do not show a clear pattern. Decreasing P/F ratios suggest increasing fertility over time if the reporting is correct. However, this pattern of P/F ratios is also produced by the increasing omission of CEB with age of woman. In fact, data evaluation (Chapter 2) revealed greater omissions of CEB by older women, especially in 1980 and in Northern and Central Regions.

[6] The ratios for women aged 15-19 are ignored in the analysis because they only have short reproductive experience and their information is more subject to error.

The slight increase in P/F ratios with woman's age in Southern Region in 1997 may be taken as an indication of declining fertility since there was no strong evidence of omission of CEB in this region in 1997. However, the decline of fertility seems to be well established only in Maputo Province and Maputo City, where the P/F ratios increase steeply (beginning from age 20-24) with the age of woman (see Appendix Table C3.1).

The census-based P/F ratios for women aged 20-24 (P_2/F_2) are high, suggesting the presence of reporting errors. In some provinces (see Appendix Table C3.1), especially from the 1980 Census, the P_2/F_2 ratios suggest under-reporting as high as 80 per cent, if fertility is assumed constant. It appears that the misperception of the reference period inflated the P/F ratios. Most ratios from the DHS are below 1.0, suggesting that there may have been over-reporting of current births in the DHS due to birth displacement, that is, some children born more than one year before the survey were recorded as born in the year preceeding the 1997 DHS.

Census P_2/F_2 ratios are considered too high to be used as adjustment either alone or averaged with P_3/F_3. The application of the P/F Ratio method to data for a number of English-speaking sub-Saharan African countries in the 1980s also showed that in many of them the P_2/F_2 values were very high, and could not be used as adjustment factors (Muhwava and Timæus 1996:15). On the other hand, P_4/F_4 is considered to be too low as a result of increasing omission of CEB with age of woman. Thus, P_3/F_3 was taken as the most reasonable adjustment factor and was used in both censuses and all provinces and regions. The total fertility rates estimated from the DHS were adjusted either by P_3/F_3 or P_2/F_2 whichever was higher. The adjusted total fertility rates from the three sources are presented in Table 3.2. Overall, the TFRs estimated from the DHS are lower (except for Northern Region) than those from the census, reflecting the already discussed higher P/F ratios in the censuses than in the DHS.

Table 3.2 P/F ratio estimates of total fertility rate by region, Mozambique 1980 and 1997

Region	Total fertility rate					
	1980 Census		1997 Census		1997 DHS	
	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted
Northern	5.5	7.4	5.6	6.6	6.5	6.8
Central	6.3	8.7	5.4	7.0	6.7	6.7
Southern	5.1	6.5	4.1	5.2	5.5	4.9
Mozambique	5.7	7.7	5.1	6.4	6.2	5.9

Source: Computed from the respective sources.

3.2.2 Relational Gompertz Model

The Relational Gompertz Model (RGM) estimates fertility by fitting an age scale transformed Gompertz function to average parities or cumulated current fertility. The RGM does not assume that the quality of reporting is invariable with women's age, or that fertility has been constant in the recent past (Zaba 1981:1). However, if fertility has been changing rapidly the estimates are less reliable (Brass 1996:458). According to Brass (1996), the advantage of using this model rather than the P/F Ratio method is that the whole age range is used in the fitting, rather than the rates at the younger ages only. However, judgement is involved in the selection of the points that would give a straight line used to adjust fertility.

The basic formula for RGM is: $F(x)=T\,e^{-e^{[\alpha+\beta Y_s(x)]}}$
where

$F(x)$ is the cumulated fertility up to age x,
T is the total fertility rate,
$Y_s(x) = -\log[-\log F_{s(x)}]$; and
$F_s(x)$ is the standard cumulated fertility up to age x with $F_s(50)=T_s=1.0$.

A standard for high-fertility populations was developed by Booth (1984) and is used here. The parameters α and β are constants for a specific population: α indicates the age location of the distribution and β determines the spread of the fertility distribution, or the degree of concentration of the schedule. If α is 0, then the location is the same as the standard and as α becomes negative, childbearing moves to later ages. A low value of β indicates a wider spread than the standard, and as β becomes larger the variance becomes smaller. The model can be applied to mean parities by replacing $F(x)$ and $F_s(x)$ by $P(i)$ and $P_s(i)$. Zaba (1981) developed a method for fitting the RGM that separates the estimation of the pattern of fertility from the estimation of its level, that is, the fitting does not depend on the total fertility rate (it does not require independent estimates of TFR) but on the age pattern of fertility. The method is based on the use of the ratios $F(x)/F(x+5)$ or $P(i)/P(i+1)$ instead of $F(x)/T$ or $P(i)/P$. The series of partial fertility ratios $F(x)/F(x+5)$ or $P(i)/P(i+1)$ can be represented in the form of:

$$z(x) - e(x) = \alpha' + \beta g(x)$$

where $z(x)$ is $-\log[-\log\{F(x)/F(x+5)\}]$,

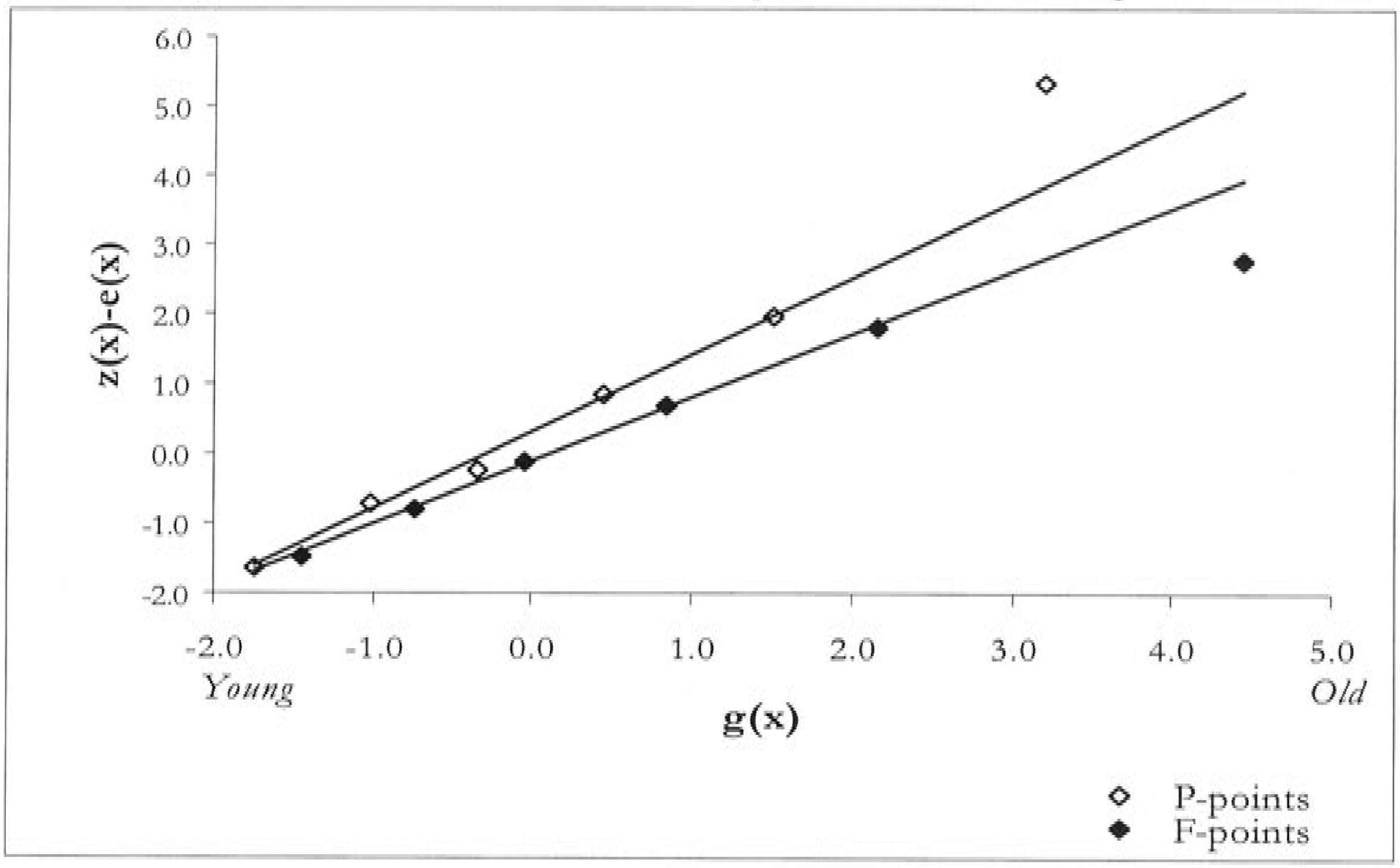
$e(x)$ and $g(x)$ are standard values calculated from $F_s(x)$ and,

β is the same as before and α' approximates closely to $\alpha + 0.48(\beta - 1)^2$.

The plots of $z(x) - e(x)$ against $g(x)$ are very important interpretative tools. On the assumption that fertility is constant over time and reporting is accurate, $z(x) - e(x)$ values obtained from mean parities (P-points) and those from cumulated fertility (F-points) should produce the same straight line. The plot of the two sets of points on the same graph can indicate whether fertility has been constant and/or there are errors in the data. Reporting errors, such as the omission of CEB and over-reporting of current births, tend to manifest as a curving away of points at higher ages from the straight line suggested by the points at the lower ages. If fertility has been changing, the line suggested by the P-points would be different (mainly in the slope) from that suggested by the F-points (Zaba 1981:7; Brass 1996:457).

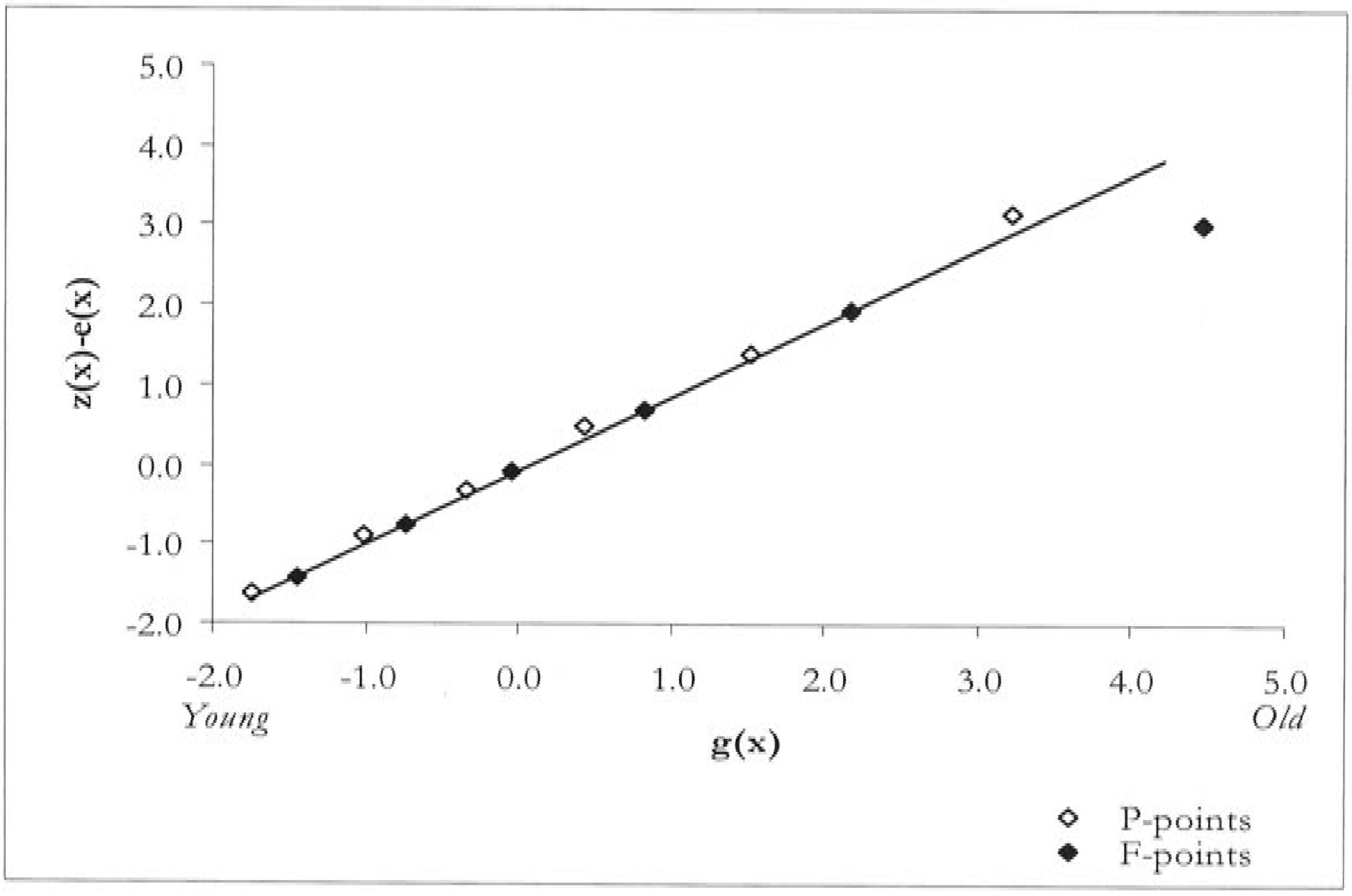
The plots of $z(x) - e(x)$ against $g(x)$ for the 1980 (Mozambique) and 1997 (Mozambique and Maputo City) censuses are presented in Figures 3.1a-c, and for all regions and provinces in Appendix Figures C3.1a, b and c. These plots show that for 1980 the F-points and P-points diverge increasingly with age. For 1997, however, P-points and F-points define almost the same regression line, though small divergences at older ages are still evident in Cabo Delgado, Niassa, Tete, Maputo Province and Maputo City. Although the divergence of the regression lines defined by the P- and F-points in 1980 suggests increasing fertility, it can also be due to increasing omission of CEB with age of women. There is also some evidence of age exaggeration (especially Northern Region in 1980), seen in the curving downward of both P and F-points at older ages. There is no evidence of fertility change in 1997 for the country or for the regions since the lines defined by the P- and F-points are almost coincidental. However, in Maputo City the two regression lines diverge with the age of woman indicating that fertility has been declining (see Figure 3.1c). Overall, the fertility trends and errors showed by the plots of $z(x) - e(x)$ against $g(x)$ are consistent with those shown by the P/F ratios. There is evidence of fertility decline only in Maputo Province and Maputo City, omission of CEB and exaggeration of the age of older women. The plots for the 1997 DHS are presented in Figure 3.1d and do not differ from those from the 1997 census.

Figure 3.1a Fit of the Relational Gompertz Model, Mozambique 1980



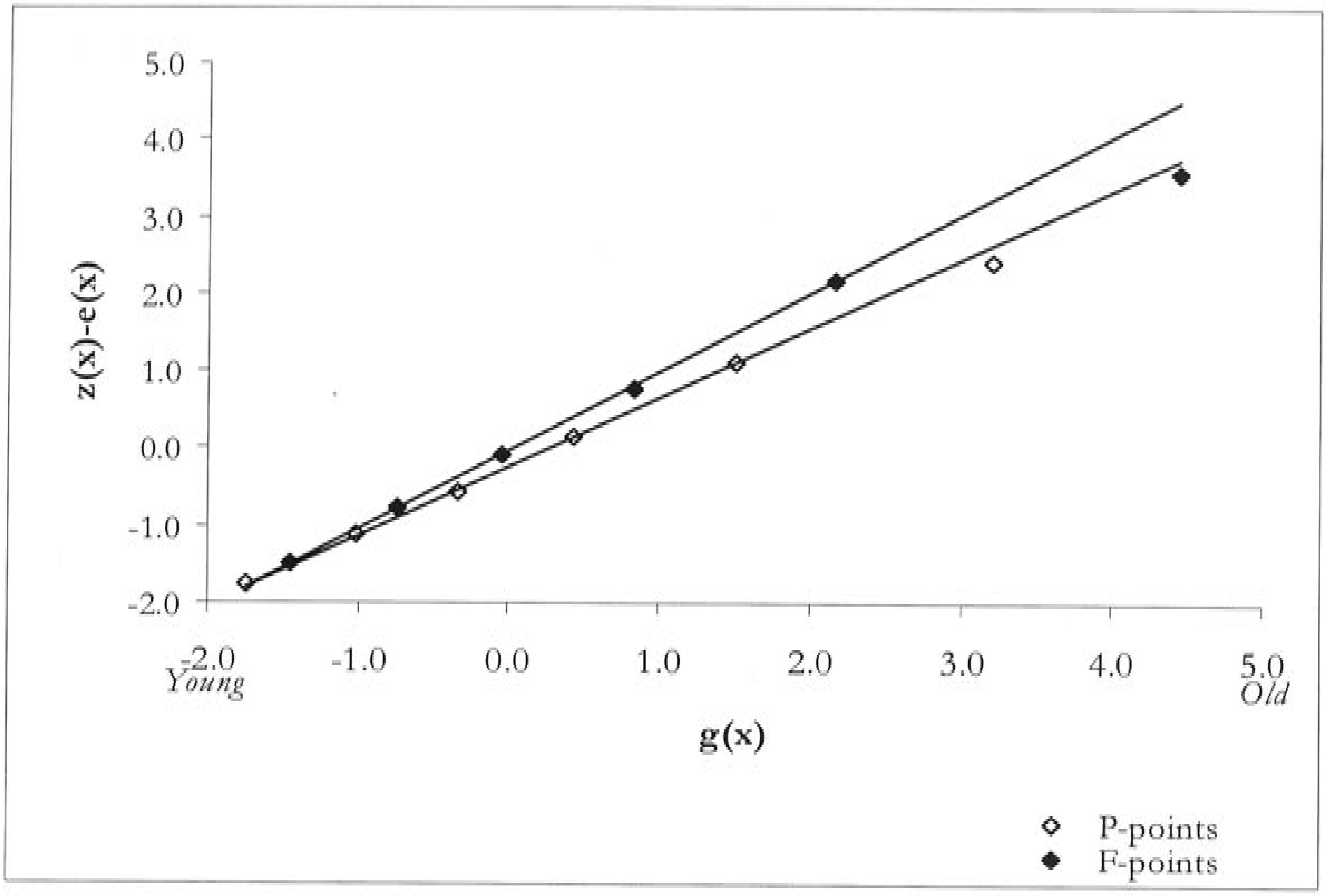
Source: Computed from 1980 Census.

Figure 3.1b Fit of the Relational Gompertz Model, Mozambique 1997



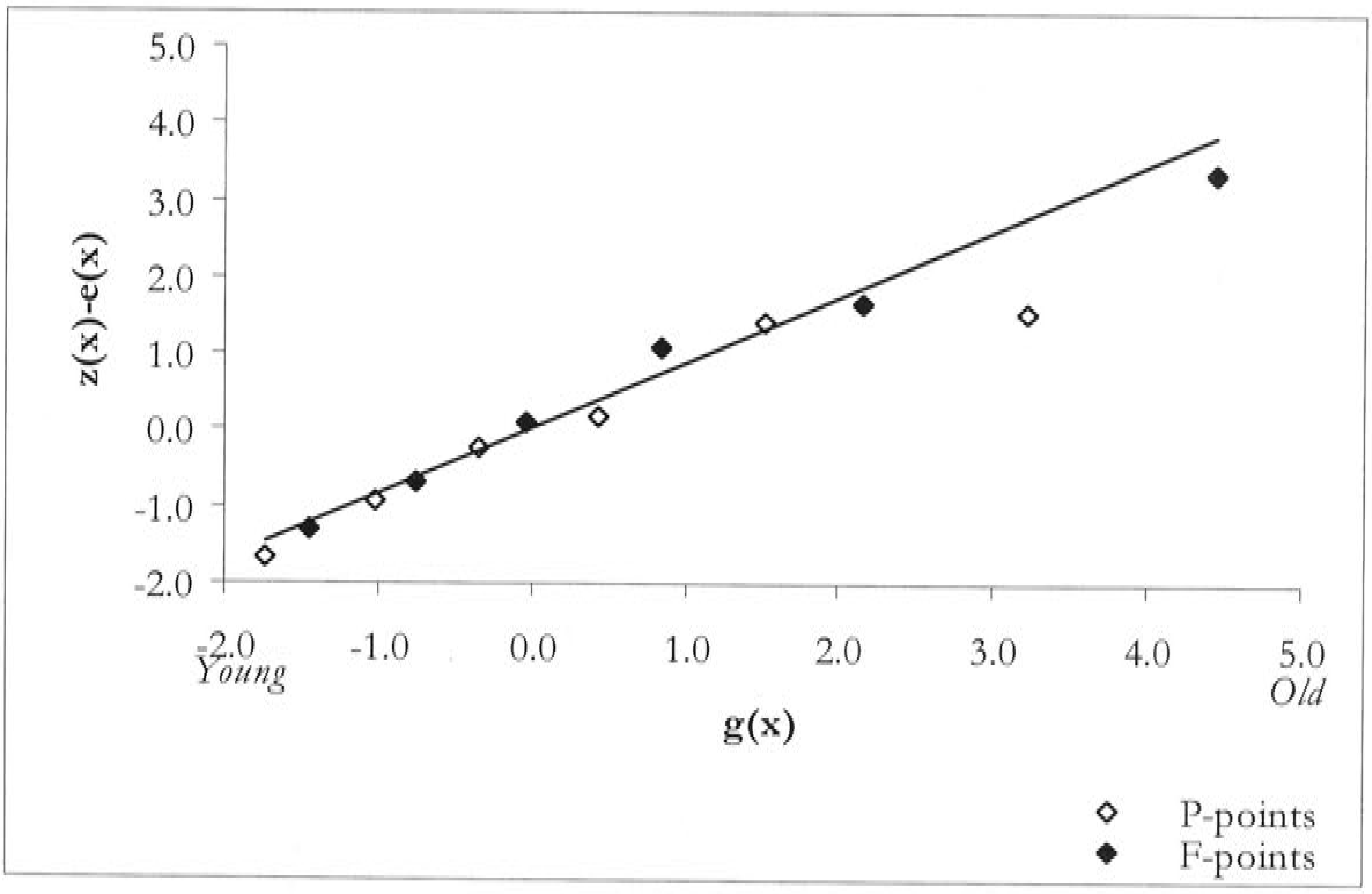
Source: Computed from 1997 census.

Figure 3.1c Fit of the Relational Gompertz Model, Maputo City 1997



Source: Computed from 1997 Census.

Figure A3.1d Fit of the Relational Gompertz Model, Mozambique 1997 DHS



Source: Computed from 1997 DHS.

Fertility levels and patterns were, then, obtained by fitting the Relational Gompertz Model to the F-points of women 15 to 39. The selection of these points was based on the following factors: (i) the two regression lines (fitted to F-points and P-points) diverge with the age of woman, mainly due to omission of CEB and age misreporting, especially in 1980; (ii) the straight line fits better the F-points than the P-points in both censuses and DHS; and (iii) to allow the comparability of the estimates across provinces and regions, it was important that all estimates be based on the same points.

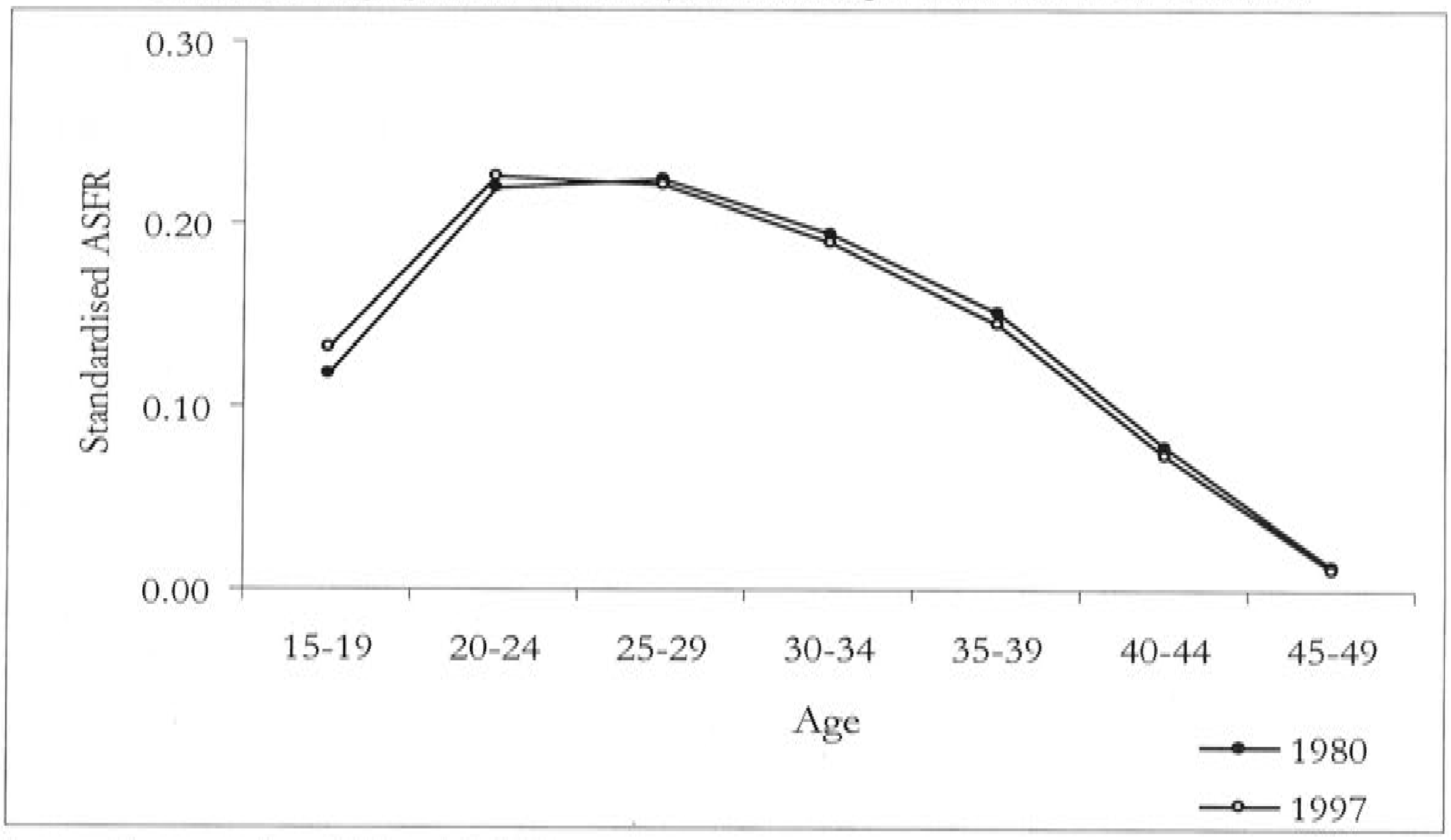
The α and β parameters and the estimated total fertility rates for both the 1980 and the 1997 censuses and the 1997 DHS by region are presented in Table 3.3. The decrease in α and increase in β coefficients between the two censuses are consistent with declining fertility. However, the slight fertility decline suggested by the change in α and β is not evident from the plots of P- and F-values. This may be related to the fact that the observed decline in TFR is not accompanied by a corresponding change in the age pattern of fertility. A decline in fertility level is normally expected to be accompanied by a narrowing of the age distribution of fertility (Zaba 1981:9); but in the case of Mozambique, this does not occur (see Figure 3.2). The decline is occurring at all age groups, which is consistent with the prediction by Caldwell, Orubuloye and Caldwell (1992:220) of a new type of transition in sub-Saharan Africa. The α and β parameters estimated from the DHS appear to show earlier fertility than those from the 1997 census but the reason is unclear. However, the RGM fitted better to the census data than to the DHS data (see Figures 3.1b and 3.1d).

Table 3.3 α and β coefficients for current fertility and the estimated total fertility rates from the Relational Gompertz Model, Mozambique 1980 and 1997

Region	1980 Census			1997 Census			1997 DHS		
	α	β	TFR	α	β	TFR	α	β	TFR
Northern	-0.047	0.884	6.7	0.019	0.905	6.4	0.112	0.893	6.5
Central	-0.141	0.888	7.9	-0.104	0.919	6.7	0.051	0.952	6.7
Southern	-0.144	0.949	6.2	-0.100	0.953	5.1	0.023	0.913	5.3
Mozambique	-0.114	0.904	7.1	-0.064	0.926	6.1	0.047	0.852	6.2

Source: Computed from the respective sources.

Figure 3.2 Age pattern of fertility, Mozambique 1980 and 1997 Censuses



Source: Computer from 1980 and 1997 Censuses.

3.2.3 The Own-Children Method

The Own-Children (O-C) method of fertility estimation (Rindfuss 1977; Retherford et al. 1979; Cho et al. 1986) is a reverse-survival technique for estimating age-specific fertility rates for up to 15 years before a census or survey. The enumerated children under 15 years old are first matched to their mothers within households, usually on the basis of answers to question on age, sex, marital status, number of living children, and relation to head of household. The matched children classified by their own age and mother's age are then reverse-survived to estimate numbers of births by age of mother in previous years. Women are also reverse-survived to estimate their number by age in previous years. Estimates are not normally computed further back than 15 years because births must then be based on children aged 15 or over at enumeration, a large proportion of whom may not live with their mothers and hence cannot be matched (Cho et al. 1986:2).

The Own-Children method was applied to data from the 1997 census to generate estimates of fertility for the 15 years before the census. Children were matched to their mothers on the basis of age, sex and relationship to the head of household. Child-mother matching could not be based on the information on the number of living children, because the census did not collect this information for women aged 50 and over. The information on marital status was also not used in the matching procedure since in Mozambique childbearing is not restricted to married women (see Chapter 4). The matching procedure may have been affected by the prevalence of polygyny (27% of married women according to the 1997 DHS) and child fostering. Polygyny and child fostering may create more mismatches than in situations where there is no polygyny or all children live with their biological mother. However, the extent to which this affected these estimates cannot be determined.

Nineteen per cent of the enumerated children under 15 years of age could not be matched to their mother. These children were allocated to women by assuming that their age distribution for each age of mother was the same as the age distribution of matched children. As expected, the percentage of unmatched children increases with age, reaching just under 50 per cent at age 14. There were more unmatched children in Northern Region (23%) than in Southern (20%) and Central (16%) Regions (see Appendix Table C3.2). This regional pattern may be related to marital instability and migration. Marital unions are more likely to be unstable in Northern and Southern Regions than in Central Region (see Chapter 5) and may lead to more children not living with their biological mothers. The migration of children and women can also cause child-mother separation. In most provinces, especially in Northern Region, secondary schools are only in the provincial capitals and most of the children attending those schools live in colleges. On the other hand, since women migrate from rural to urban areas, especially in Southern Region (Arnaldo 1996:Table 4; INE 1998b:14-17; Ministry of Planning and Finance 1998:88-89), some may leave their children behind.

Life table survival ratios for both children and women were obtained from the West Family of the Coale and Demeny Regional Model Life Tables (Coale and Demeny 1983), believed to represent the most general mortality pattern as it is derived from the largest number and broadest variety of cases (United Nations 1983:13); they were selected on the basis of the $_5q_0$ values estimated from the census child survivorship data using the Trussell variant of children ever born/children surviving method (United Nations 1983:73-96). The estimated $_5q_0$ and corresponding life expectancies are presented in Appendix Table C3.3. Mortality was assumed constant over the period of estimation. The assumption of unchanging mortality seems reasonable because of two factors. First, in most of the period covered the country was in civil war, which affected the economy, including the social infrastructure. This resulted in a slight increase in mortality from 1980 to 1997 (see Gaspar 2002). Secondly, Own-Children estimates are not very sensitive to errors in the level and pattern of mortality (Retherford et al. 1979; Cho et al. 1986), because an Own-Children estimate of an age-specific fertility rate is the product of an age-specific child-woman ratio and a quotient of two reverse-survival ratios, one for children and the other for women. As each of these two reverse-survival ratios tends to be close to one, and the quotient of the two tends to be even closer to one, the range of variability in this quotient across different levels of mortality is small (Cho et al. 1986:46).

The estimated TFRs from the Own-Children method by region are presented in Table 3.4. Provincial estimates are presented in Appendix Table C3.4. These are five-year aggregated estimates made to minimise the effect of age misreporting. From 1983-87 to 1988-92 the TFR appears to have risen in Northern and Central Regions. From 1988-92 to 1993-97 fertility remained unchanged in Central Region while declining slightly in the Northern Region. For Southern Region, the estimates show a consistent decline in fertility, especially Maputo Province and Maputo City. Single-year estimates are presented and discussed later in Section 3.3.2.

Table 3.4 Own-children estimates of total fertility rate by region, Mozambique 1983-1997

	Total fertility rate		
Region	1983-87	1988-92	1993-97
Northern	5.6	6.7	6.3
Central	6.5	6.8	6.8
Southern	6.0	5.2	4.7
Mozambique	6.1	6.3	6.0

Source: Computed from 1997 Census.

3.2.4 Synthesis of the estimation of fertility levels and patterns

Three indirect methods have been used to estimate fertility levels and patterns from 1980 and 1997 data. These methods are also important tools for identifying errors in the data and assessing their effect on the resulting estimates. Table 3.5 summarises the possible sources of error and identifies their effect on the estimated fertility levels derived from the 1980 and 1997 censuses using different methods.

The omission of CEB produced a decreasing pattern of P/F ratios and divergence between P- and F-points of the RGM, indicating an exaggerated increase in fertility in the period preceding the 1980 census. Also, the omission of current births resulted in positive bias in the TFR estimated by the P/F Ratio method. The low levels of Own-Children TFR in the more recent years (1995-97) of the estimation period in some provinces are also related to the omission of CEB. According to Abbasi-Shavazi (2000:6), the Own-Children estimates for the first two years before the enumeration are generally disregarded because they reflect the under-enumeration of children under age 2.

Table 3.5 Errors in the data, their effect on the estimated fertility levels and evidence from 1980 and 1997 Censuses

Type of error	Effect on			Evidence of errors
	P/F Ratio	RGM	Own-children estimates	
Omission of CEB (increasing with age of woman)	P/F ratios decrease with age of woman. False indication of rising fertility	P-points curve upwards with increasing women's age	Underestimation of TFR for the 3 years preceding the census (if young children more likely to be omitted) and for the last 3 years (omission of children not living at home with their mothers)	Strong evidence in 1980 Census, and Northern and Central Regions from 1997 Census
Omission of current births (shorter year), invariant with age of woman	High P/F ratios (greater than 1). Overestimation of TFR	No effect	Underestimation of TFR in the years close to the census year	Some evidence in both censuses, especially 1980 (P/F ratios) and 1997 (own-children estimates)
Over-reporting of current births, especially by older women (report of grandchildren and longer year)	P/F ratios decrease with the age of women, falsely indicating rising fertility	F-points curve downward at older ages. P and F-points may diverge with women's age indicating a false rise in fertility	Underestimation of age-specific fertility rates (ASFRs) at older ages in the most recent year	Evidence from 1980 census for all provinces and regions and most of the Central and Northern provinces in 1997
Overstatement of ages of girls 10-14 and 15-19 (mothers and/or married)	Underestimation of ASFRs of women 15-19 years old	No effect	Underestimation of ASFRs of women 15-19 years old in the years close to the census year	Evidence in both censuses, especially 1980 census
Age exaggeration by women	P/F ratios decrease with age of woman. Overestimation of ASFRs at older ages	P and F-points both curve downwards at older ages, affecting the age pattern of fertility	Overestimation of ASFRs at older ages	Evidence in 1980 census and some provinces in 1997 census
Digit preference (women and children under 15)	Fluctuation of P/F ratios, affecting the estimated TFR	Fluctuation of P and F-points. Poor fit and positive/negative effect on the estimated TFR	Overestimation of TFR in years corresponding to preferred digits, and underestimation of TFR in years corresponding to avoided digits	Evidence in single year own-children estimates in all provinces

Note: Shading indicates errors and effects were observed.

Table 3.6 shows TFRs estimated by the three methods and INE (National Institute of Statistics) estimates for regions and provinces. For the Own-Children (O-C) estimates, averages for the most recent five years (1993-1997) are shown in order to lessen the effect of age misreporting and the omission of young children.

Table 3.6 Estimated total fertility rates, Mozambique 1980 and 1997

	1980 Census			1997 Census			
Region/Province	P/F Ratio	RGM	INE estimates	P/F Ratio	RGM	O-C 1993-97	INE estimates
Northern	**7.4**	**6.7**	-	**6.6**	**6.4**	**6.3**	-
Niassa	8.1	7.5	7.5	7.2	6.7	7.2	6.8
Cabo Delgado	7.3	6.6	6.5	6.2	5.8	5.6	5.6
Nampula	7.2	6.6	6.2	6.7	6.4	6.4	6.3
Central	**8.7**	**7.9**	-	**7.0**	**6.7**	**6.8**	-
Zambézia	9.3	8.4	8.2	7.0	6.7	6.9	6.6
Tete	8.5	7.9	7.3	7.7	7.1	7.2	6.7
Manica	8.4	7.5	7.1	6.9	6.5	6.6	6.3
Sofala	7.6	7.0	6.5	6.4	5.8	6.1	5.8
Southern	**6.5**	**6.2**	-	**5.2**	**5.1**	**4.7**	-
Inhambane	6.4	6.0	6.1	5.2	5.3	5.0	5.3
Gaza	6.9	6.4	6.4	5.7	5.4	5.2	5.0
Maputo Province	6.8	6.2	6.4	5.3	4.8	4.7	4.8
Maputo City	6.3	5.8	5.7	4.5	3.9	3.8	4.2
Mozambique	**7.7**	**7.1**	**6.4**	**6.4**	**6.1**	**6.0**	**5.9**

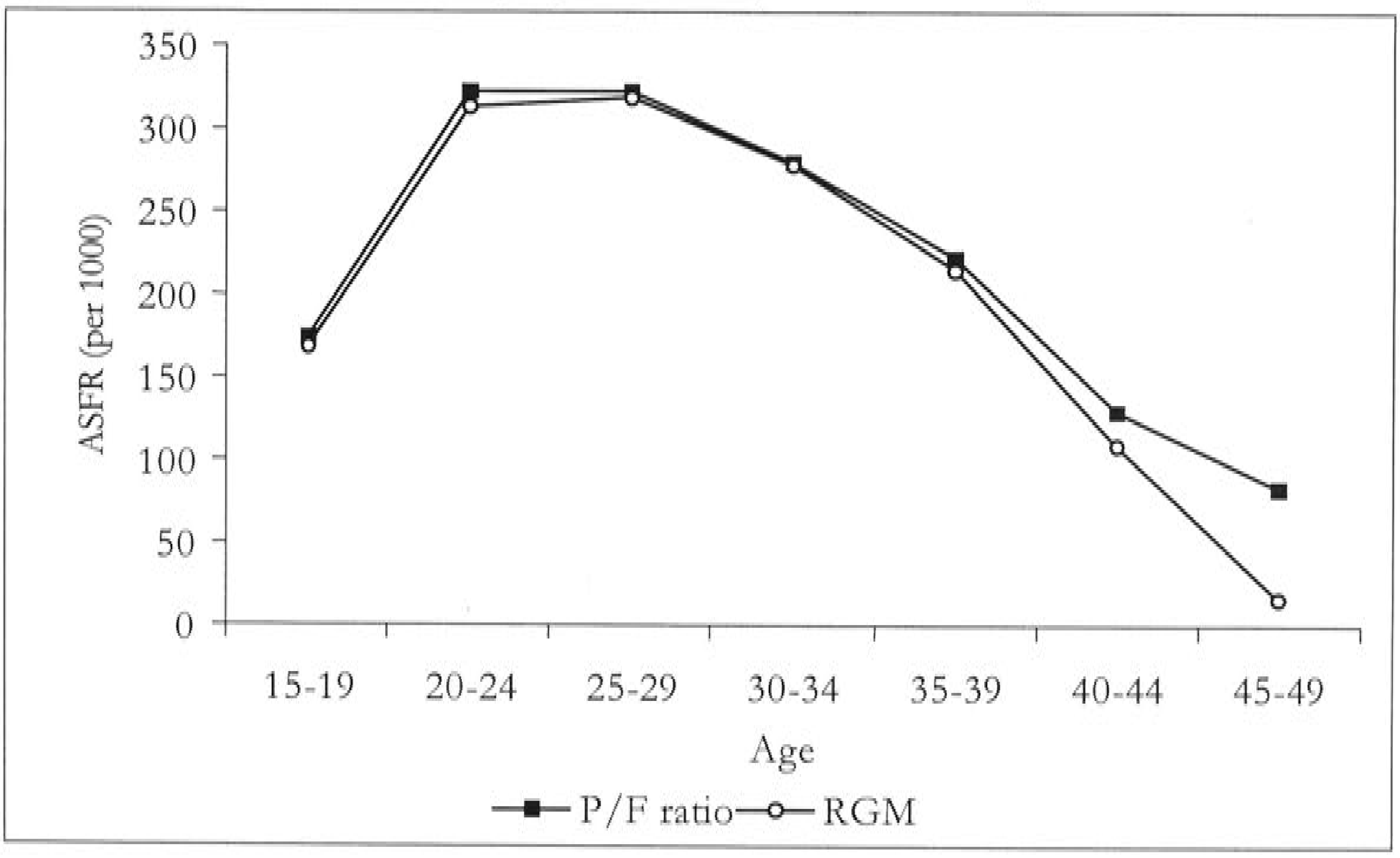
Source: Computed by author, except INE estimates 1980 (CCR 1983a:24) and 1997 (INE 1998c:Table 2.7).

The estimates from the three methods (P/F Ratio, RGM and Own-Children method) are fairly consistent in all provinces and regions. However, there are small differences, which may be related to differences in the underlying assumptions of the techniques as well as to different sensitivity to reporting errors. The national 1997 Own-Children estimates are 6 per cent and 2 per cent lower than from P/F Ratio and RGM, respectively, because Own-Children estimates refer to the more recent years and hence are derived from young children who are more vulnerable to omission. On the other hand, P/F Ratio estimates are consistently higher (8% in 1980 and 5% in 1997) than those from RGM. The difference is higher in 1980 and in the Northern (9% in 1980 and 3% in 1997) and Central (9% in 1980 and 4% in 1997) Regions compared with 1997 and Southern Region (5% in 1980 and 2% in 1997), respectively. It has been shown that the 1980 P/F Ratio estimates are biased upward due to omission of current births. Gaspar (1989) and Perpétuo (1993) also considered the P/F Ratio unsuitable when applied to the 1980 Census because of massive misperception of the reference period. In 1997, the reference period error is less than in

1980, but as discussed in the next section fertility is declining, especially in the Southern Region, making the P/F Ratio estimates biased upward. Since the RGM does not assume constant fertility or that the reported age pattern is correct, its estimates are more reliable and are used in the rest of the thesis.

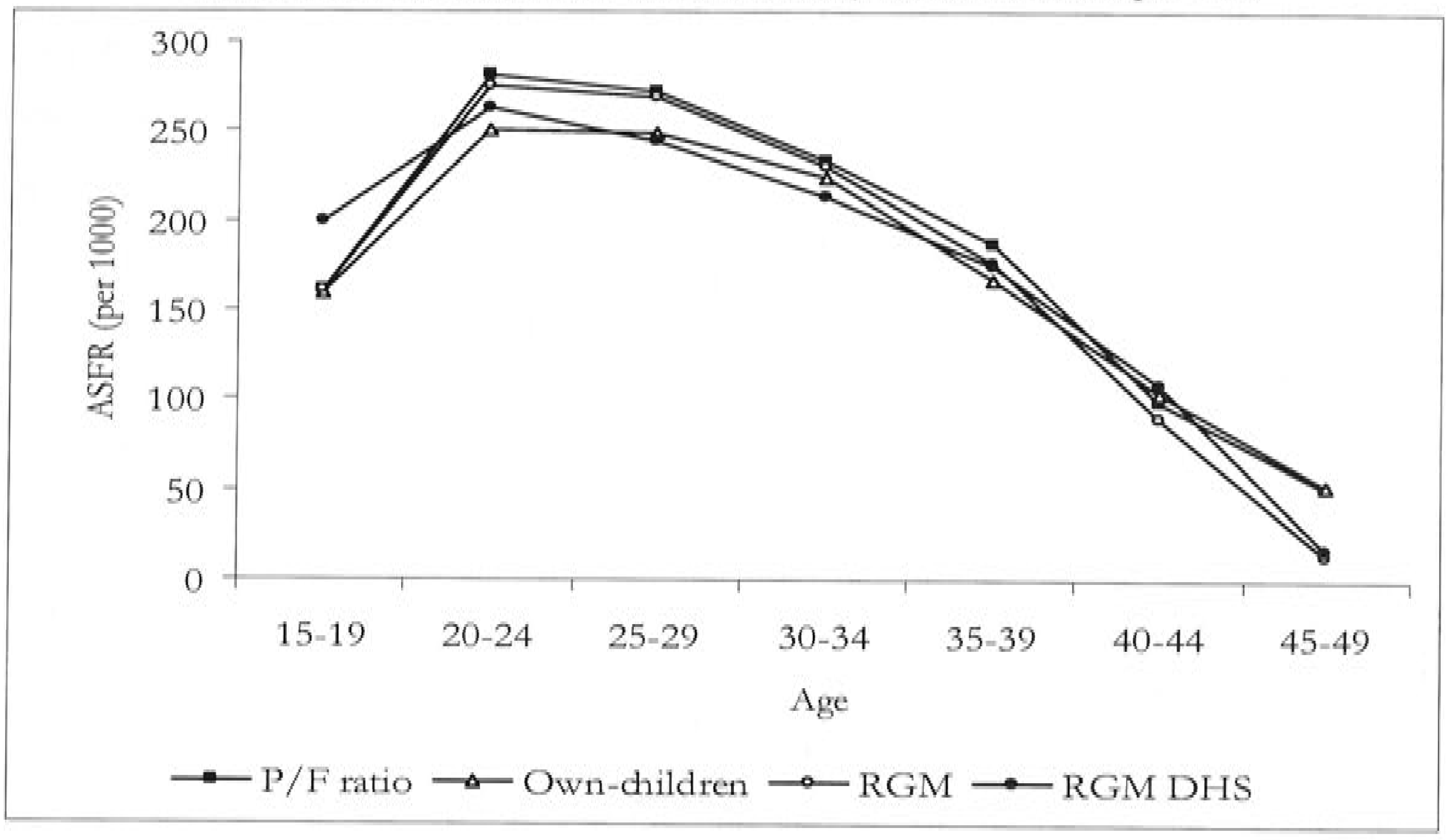
The estimated age-specific fertility rates (ASFRs) from the three methods are similar (Figure 3.3a and b, national, and Appendix Figures C3.2.1-2, regional and provincial). The census-based ASFRs from the P/F Ratio and RGM show a similar pattern up to age group 35-39. For the older age groups 40-44 and 45-49 the ASFRs from the P/F Ratio are higher than those from the RGM. The ASFRs from the P/F Ratio at older ages are overestimated by the exaggeration of the age of woman. This error also affects the ASFRs estimated from the Own-Children method, which show a pattern similar to those estimated by the P/F Ratio, except at ages 20-39 where Own-Children ASFRs are lower than those from the P/F Ratio. The age exaggeration by older women did not affect the RGM ASFRs because the model was fitted to women (15-39) with better reporting. The DHS-based ASFRs show much higher fertility at the younger ages than the ASFRs from the census, reflecting, perhaps, better reporting by young and/unmarried women.

Figure 3.3a Estimated age-specific fertility rates, Mozambique 1980 Census



Source: Computed from 1980 Census

Figure 3.3b Estimated age-specific fertility rates, Mozambique 1997



Source: Computed from 1997 Census

3.3 Fertility trends

Fertility trends are assessed in various ways: examination of the changes in TFR between 1950 and 1997; examination of annual TFRs computed by applying the Own-Children method to the 1997 Census, analysis of cohort and period fertility rates from birth histories and censored parity progression ratios computed from the 1997 DHS.

3.3.1 Fertility change from 1950 to 1997

Fertility trends in the period before 1980 in Mozambique are difficult to determine because the estimates were derived from poor-quality census data (Gaspar 1989). The TFR was estimated to be about 7 children per woman in the 1950s and 1960s and declined very slowly to 6.6 in 1970 (INE n.d.). Table 3.7 presents absolute and percentage changes in TFR by time period from 1950 to 1997. The data do not suggest a sustained trend over the period considered. Fertility declined slightly from 1950 to 1970, increased from 1970 to 1980 and declined again from 1980 to 1997. However, the magnitude and perhaps even the direction of these changes may be affected by differences in data quality and in the methods used in the estimation.

The apparent 8 per cent increase in fertility from 1970 to 1980 is to some extent brought into question by the fact that the data from the 1970 Census were seriously affected by age misreporting and omissions, which may have contributed to the underestimation of fertility (Gaspar 1989) . However, a rise in fertility is supported by decreasing P/F ratios, and increasing divergence of P and F-points of the RGM in 1980 (see Appendix Table C3.1 and Figure C3.1a). It could be that there was a 'post independence baby boom' in Mozambique. Experience from other countries shows that the TFR sometimes rises following a revolution (Muhwava and Timæus 1996; Kinfu 1999, 2000; Abbasi-Shavazi 2000). According to Abbasi-Shavazi (2000:11) fertility rose in Iran following the 1979 Islamic Revolution, owing to the relaxation of the family planning program and a pro-natalist campaign. Zimbabwe may have experienced a fertility rise after independence in 1980 (Muhwava and Timæus 1996); and in Addis Ababa (Ethiopia), an analysis in fertility trends identified a temporary rise of fertility following the 1974 revolution (Kinfu 1999:5-6).

Table 3.7 Change in TFR, Mozambique 1950-1997

Period	Absolute Change	% Change	Average annual Change (%)
1950-60	-0.1	- 1.4	-0.1
1960-70	-0.4	- 5.7	-0.6
1970-80	0.5	7.6	0.7
1980-97	-1.0	-14.4	-0.9

Source: Computed from: 1950 to 1970 (INE n.d.); 1980 and 1997, see Table 3.6 RGM estimates.

In addition, the increase in fertility between 1970 and 1980 may be related to the reduction in pathological infertility in that period, resulting from the government efforts to provide universal and free access to health services, which may have contributed to the reduction in venereal diseases (see Chapter 7). This is supported by the fact that other sub-Saharan African countries also experienced an increase in fertility in the same period due to reduction in infertility (e.g. Frank 1983; Cohen 1998).

For the period between 1980 and 1997 the estimates show a decline of national TFR by 14 per cent, corresponding to one birth per woman over the 17-year period. However, caution should be used when interpreting this decline because there were reporting errors in both censuses that could affect the magnitude of fertility change.

Table 3.8 presents the absolute, percentage, and average annual changes in TFR by province. These are presented only for the period 1980 - 1997, because there are no reliable data for the analysis of provincial trends for the period before 1980, since for the previous censuses TFR was not estimated by province, and also because provincial boundaries had been changing over that period. The estimates for the 1980-1997 period show considerable regional and provincial differences in fertility change. The smallest decline (0.3 children per woman) occurred in Northern Region, while Central and Southern Regions had significant declines (about 14 and 17%, respectively), corresponding to one birth per woman.

Table 3.8 Change in TFR by region and province, Mozambique 1980-1997

Region/Province	Change in TFR		
	Absolute Change	% Change	Average annual change (%)
Northern	**-0.3**	**-4.5**	**-0.27**
Niassa	-0.8	-10.5	-0.65
Cabo Delgado	-0.8	-12.2	-0.76
Nampula	-0.2	-2.4	-0.14
Central	**-1.1**	**-14.4**	**-0.92**
Zambézia	-1.7	-20.2	-1.33
Tete	-0.7	-9.4	-0.58
Manica	-1.1	-14.2	-0.90
Sofala	-1.3	-18.2	-1.18
Southern	**-1.0**	**-16.5**	**-1.04**
Inhambane	-0.7	-11.9	-0.74
Gaza	-1.0	-16.0	-1.03
Maputo Province	-1.4	-22.1	-1.47
Maputo City	-2.0	-33.7	-2.42
Mozambique	**-1.0**	**-14.4**	**-0.91**

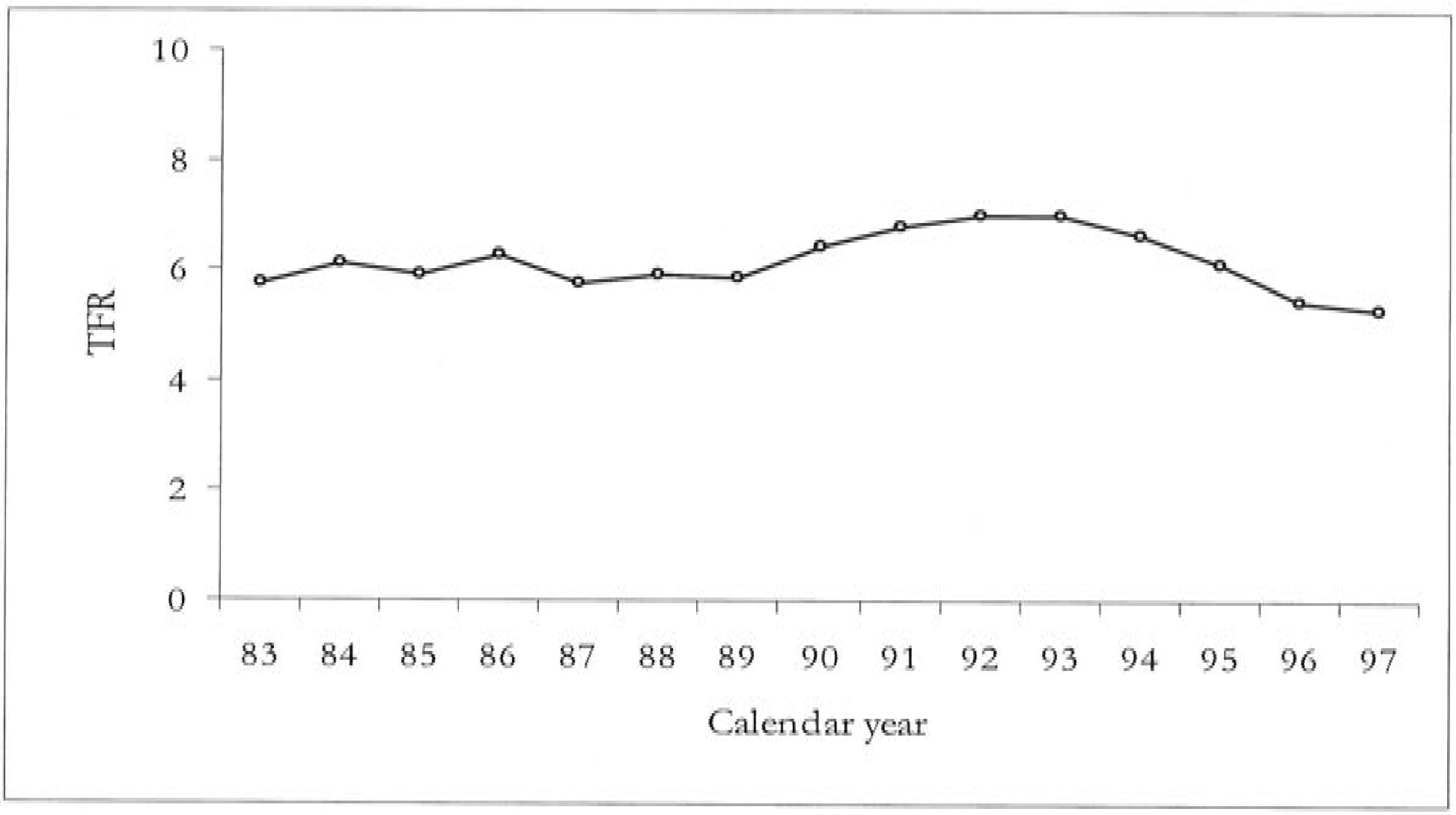
Source: Computed from Table 3.6 RGM estimates.

The provinces of Maputo City, Maputo Province and Zambézia experienced the largeest fall, more than 20 per cent, corresponding to about two births per woman, whereas in Nampula, Tete and Inhambane the decline was 0.7 children per woman or less. While the magnitude of decline for Maputo City and Maputo province seem consistent with their socio-economic development (see Chapter 1), that of Zambézia is rather surprising if one looks at its socio-economic development. The extent to which socio-economic development affects provincial fertility levels is discussed in Chapter 4.

3.3.2 Trends in annual TFR from 1983 to 1997

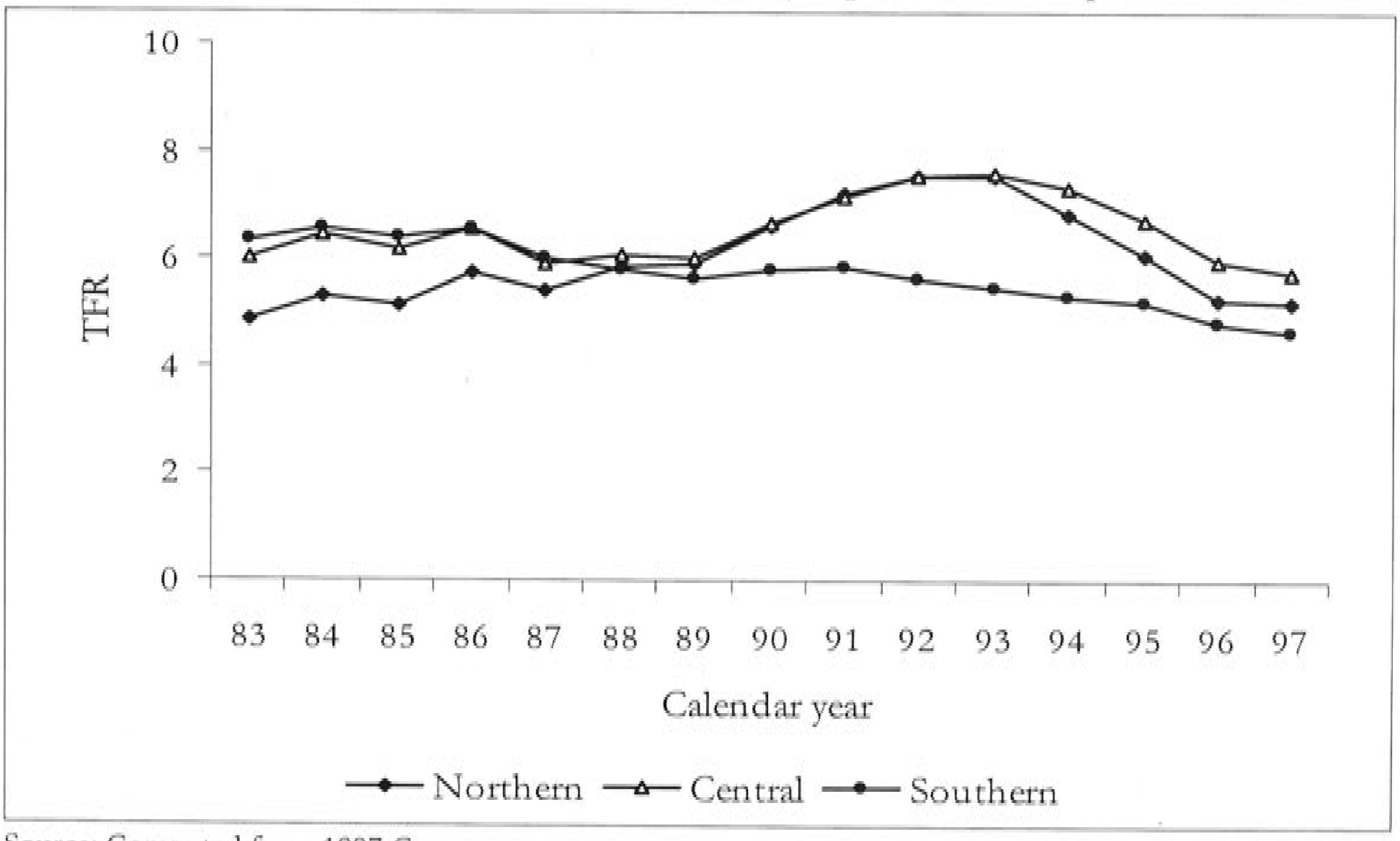
The national, regional and provincial declines in TFR from 1980 to 1997 are examined in more detail by looking at the annual rates from 1983 to 1997 derived from the Own-Children method to assess whether the declines were consistent thoughout the considered period. Figures 3.4a (national) and 3.4b (regions) show the annual TFRs for the period 1983-1997 obtained from the 1997 Census by application of the Own-Children method. The estimates are three-year moving averages (except for 1983 and 1997 where a two-year average was used), to lessen the distortions due to age misreporting and the possible effects of period adverse factors that may not be related to long-term trends (Cho et al. 1986:6; Kinfu 2000:67-68).

Figure 3.4a Own-children estimates of total fertility rate, Mozambique 1983 - 1997



Source: Computed from 1997 Census.

Figure 3.4b Own-children total fertility rate by region, Mozambique 1983 - 1997



Source: Computed from 1997 Census.

The national estimates and those of the Northern and Central Regions do not give clear evidence of consistent fertility decline during the period of estimation. Nevertheless, there was a consistent decline in the Southern Region, from more than 6 children per woman in early 1980s to just under 5 children per woman in 1997. Figures 3.4a and 3.4b, as well as the graphs of all Central Provinces (see Appendix Figure C3.3.1) show almost stable fertility between 1983 and 1989, with a slight decline to lower levels between 1987 and 1989 in some provinces, especially Zambézia and Sofala, and a slight rise in all provinces of Northern Region.

It is likely that the relatively low levels of fertility observed between 1987 and 1989 for the national and Central and Southern Regions are related to the effect of civil war and economic hardship. In this period, the war was more intense and the Central Region (especially Zambézia and Sofala provinces) was the most affected. According to Lindstrom and Berhanu (1999:255) civil war may result in significantly lower completed fertility for younger cohorts of women and can delay marriage. In their study in Ethiopia, they found that spousal separation was the main mechanism by which the intensity of military conflict affected fertility. Agadjanian and Prata (2001, 2002) found that in Angola war had a negative effect on fertility. Also, civil war as well as the failure of economic programs under a socialist regime, may have led to an economic crisis in the late 1980s, when Mozambique recorded its lowest Gross Domestic Product, about 80 US dollars per capita (Mozambique 1998:Graph 4.1). It has been argued that economic crisis may depress fertility (Lee 1990; National Research Council 1993b; Palloni, Hill and Aguirre 1996; Eloundou-Enyegue, Stokes and Cornwell 2000). A study in Cameroon (Eloundou-Enyegue et al. 2000:68) found that the timing of fertility decline and its magnitude were consistent with the thesis of a crisis-induced decline. However, this was largely confined to urban areas, because of their vulnerability to market shocks.

The national TFR and those for Northern and Central Regions increased from 1990 to 1994. Such a trend may be genuine or an artefact of age misreporting. As noted in Chapter 2, the period 1990 - 1994 coincides with two major historical events, the end of the civil war in 1992 and the first democratic elections in 1994, which may have been used in the estimation of age, resulting in more children being reported as aged between 3 and 6. This hypothesis is strengthened by the fact that this pattern is only clearly evident in regions and provinces with poor reporting. On the other hand, the rise in TFR after 1990 may be a response to economic growth and political stability. Economic conditions improved following the introduction of the Economic Rehabilitation Program in 1987 (Mozambique 1998) and the beginning of the negotiation of peace which led to the Peace Agreement between the Government and RENAMO in 1992 (see Chapter 1). However, the effect of reporting errors cannot be ruled out.

3.3.3 Cohort and period fertility from birth histories

This section assesses fertility trends from 1997 MDHS birth histories. Birth histories can be used to compute cohort and period fertility rates for successive periods before the survey to obtain recent fertility trends or to evaluate the quality of data (Hobcraft et al. 1982). These fertility rates are obtained by dividing the number of births by the product of the number of women in the cohort and the number of years of exposure. The rates can be computed by single years before the survey, but to avoid fluctuation in reported parities that can be commonly caused by age misreporting, five-year periods were used. Table 3.9 shows the resulting cohort-period age-specific fertility rates for successive five-year periods before the survey for the country as a whole as well as for the three regions. These rates show a modest decline in fertility in the two most recent periods (5-9 and 0-4 years) before the survey. The decline appears to occur at all ages, which is consistent with the Caldwell et al. (1992:220) prediction of a new type of fertility transition in Africa, but with higher declines at ages over 30. Between the periods 5-9 and 15-19 years before the survey, there is an increase in fertility for the older ages and a decrease for the younger ages. For the periods 15 or more years before the survey the rates show an unclear trend suggesting the presence of distortion in the data, probably due to omissions and birth displacement, which tends to increase from the recent to the remote period before the survey. As the female literacy rate is low in Mozambique (26% in 1997), the data are likely to have been affected by reporting errors since women, especially older ones, may have found it difficult to reckon the dates of birth for their children, particularly those born many years before the survey. The data for the five-year period before the survey probably suffered relatively little from misdating because the survey date was exactly five years after the end of the war (1992) making it easier for women to distinguish births that occurred after the end of the war from those that occurred before.

Table 3.9 Cohort-period age-specific fertility rates and percentage change by region, Mozambique 1968-1997

	Period before the survey										
	0-4	$_{0\text{-}4}\Delta_{5\text{-}9}$	5-9	$_{5\text{-}9}\Delta_{10\text{-}14}$	10-14	$_{10\text{-}14}\Delta_{15\text{-}19}$	15-19	$_{15\text{-}19}\Delta_{20\text{-}24}$	20-24	$_{20\text{-}24}\Delta_{25\text{-}29}$	25-29
Mozambique											
15-19	0.173	*-4.8*	0.182	*-5.0*	0.191	*-2.4*	0.196	*-0.9*	0.198	*3.9*	0.190
20-24	0.230	*-1.5*	0.234	*-0.8*	0.236	*-1.9*	0.240	*2.8*	0.234	*27.2*	0.184
25-29	0.257	*-7.6*	0.278	*-0.6*	0.280	*-0.7*	0.282	*26.9*	0.222		
30-34	0.203	*-20.9*	0.256	*-2.2*	0.262	*10.9*	0.236				
35-39	0.174	*-15.6*	0.206	*5.3*	0.195						
40-44	0.113	*-15.6*	0.133								
45-49	0.056										
TFR <35	4.3		4.8		4.8		4.8				
Northern Region											
15-19	0.202	*0.7*	0.200	*-0.2*	0.201	*4.1*	0.209	*4.2*	0.218	*7.8*	0.203
20-24	0.231	*-13.1*	0.266	*-8.0*	0.289	*16.6*	0.248	*17.9*	0.210	*35.5*	0.155
25-29	0.243	*-16.0*	0.290	*0.8*	0.287	*11.3*	0.258	*27.8*	0.202		
30-34	0.197	*-32.7*	0.293	*11.3*	0.263	*21.8*	0.216				
35-39	0.160	*-19.1*	0.198	*9.5*	0.181						
40-44	0.120	*-1.1*	0.121								
45-49	0.043										
TFR <35	4.4		5.2		5.2		4.7				
Central Region											
15-19	0.181	*-8.0*	0.196	*-1.6*	0.199	*-2.5*	0.205	*-2.4*	0.210	*7.0*	0.196
20-24	0.253	*2.9*	0.246	*10.6*	0.222	*-5.9*	0.236	*-1.1*	0.239	*36.8*	0.175
25-29	0.274	*-8.3*	0.298	*-0.6*	0.300	*17.9*	0.254	*1.5*	0.250		
30-34	0.201	*-24.7*	0.267	*5.2*	0.254	*-3.7*	0.264				
35-39	0.192	*-19.0*	0.237	*2.0*	0.232						
40-44	0.114	*-40.4*	0.191								
45-49	0.075										
TFR <35	4.5		5.0		4.9		4.8				
Southern Region											
15-19	0.125	*-8.4*	0.136	*-3.0*	0.140	*-7.3*	0.151	*-5.7*	0.160	*9.8*	0.146
20-24	0.187	*-4.6*	0.196	*-17.9*	0.239	*-0.4*	0.240	*-0.9*	0.242	*26.9*	0.191
25-29	0.208	*-12.1*	0.237	*-11.3*	0.267	*-10.9*	0.300	*20.7*	0.248		
30-34	0.182	*-9.6*	0.201	*-20.6*	0.253	*-0.8*	0.255				
35-39	0.135	*-21.1*	0.172	*-12.5*	0.196						
40-44	0.097	*-15.9*	0.115								
45-49	0.042										
TFR <35	3.5		3.9		4.5		4.7				

Note: Δ refers to percentage change over time between adjacent columns.
Source: Computed from 1997 DHS.

In regional perspective, the rates show some differences in fertility trends. The age-specific fertility rates for the Southern Region show declining fertility, which began as long ago as 25 years before the survey. For the Northern and Central Regions the rates do not show a consistent pattern of decline, although a declining trend is apparent for the most recent period. These different trends by region are also supported by the cumulated TFR of women below 35 years of age, which for the Southern Region declined consistently from 4.7 children per woman 15-19 years before the survey to 3.5 in the five-year period before the survey. For the Northern and Central Regions the decline is apparent only from the period 5-9 years before the survey. For the Northern Region the increase in fertility for the period 10-14 to 5-9 years before the survey is consistent with the trend suggested by the Own-Children estimates in the previous section.

Table 3.10 Comparison of total fertility rate for women below age 35 by time period, Mozambique 1983-1997

	1993-97	1988-92	1983-87
Mozambique			
DHS birth histories	4.3	4.8	4.8
Census-reconstructed birth histories	4.4	4.5	4.4
Northern Region			
DHS birth histories	4.4	5.2	5.2
Census-reconstructed birth histories	4.7	4.8	4.0
Central Region			
DHS birth histories	4.5	5.0	4.9
Census-reconstructed birth histories	4.9	4.7	4.6
Southern Region			
DHS birth histories	3.5	3.9	4.5
Census-reconstructed birth histories	3.4	3.8	4.6

Source: Computed from 1997 Census and 1997 DHS.

The TFR for women below the age of 35 obtained from the DHS birth histories for 1983 to 1997 can be compared with those obtained from the reconstructed census birth histories using the Own-Children method. Table 3.10 presents such a comparison by five-year time period. For the whole country, the trends shown by the two sets of data are similar, but the TFR from the census is slightly higher in the most recent period and lower in remote periods before the census than the estimates from the DHS. For Southern Region the two sources show similar trends. For the Northern and Central regions, the census shows increasing fertility, with higher values for the most recent period, while the DHS shows relatively high values in the remote periods before the survey and declining fertility in the most recent period. These inconsistencies may be related to different reporting errors. As discussed earlier, the Own-Children TFR for 1993-97 may be overestimated because of age misreporting related to the use of the 1992 Peace Agreement and 1994 democratic election as historical events in the estimation of age. The difference between DHS and Own-children estimates for Northern Region in the period 1983-87 is due to underestimation in the latter. As discussed in Section 3.2.3, more than 40 per cent of older children (10-14) could not be matched to their mothers, mainly due to high marital instability in that region (see Chapter 5).

In summary, the DHS shows no decline in fertility between 1983-87 and 1988-92 in all but Southern Region, whereas the census shows increases in Northern and Central Regions. Further assessment is performed below by computing the P/F ratios from birth histories.

The availability of birth history data also allows the computation of P/F ratios without interpolation or use of an external model (Hobcraft et al. 1982). Thus, F-values (period cumulated fertility) are obtained by cumulating the cohort-period age-specific fertility rates by period from the youngest to the oldest age group, and P-values (cohort cumulated fertility) by cumulating by cohort. Hobcraft et al. (1982:299) recommend the exclusion of the common cells (common for a cohort's experience and the equivalent period cumulative fertility) so that the ratios are more sensitive indicators of the difference between cohort and period fertility since the common cells tend to force the ratios towards unity (Hobcraft et al. 1982:299). Table 3.11 presents the P/F ratios obtained by the application of this method. For Southern Region the ratios for the two most recent periods before the survey are mostly above one and show an increasing trend over age, which is indicative of fertility decline. However, the ratios for the 45-49 age group are less than those for the 40-44 age group, suggesting omission of births by older women. For the country as a whole and for Central and Northern Regions, the P/F ratios for the most recent period before the survey are above one (except for the last age group), but there is no clear increase with age of woman. For the period 5-9 years before the survey the ratios do not show a clear trend. This implies that the fertility decline in Northern and Central Regions is both smaller and more recent than that of Southern Region. The P/F ratios for periods 10-14 and more years before the survey are near unity and show a decreasing pattern with age. For Northern Region the ratios are lower than one at all ages and indicate increasing fertility over time, which is consistent with the previous analysis (see Tables 3.9 and 3.10).

In summary, the analysis of DHS data supports the findings in the preceding sections that fertility appears to have started to decline in Mozambique, and that Southern Region is leading the way. Further investigation of fertility trends is carried out in the following section using a measure that is robust to reporting errors, the parity progression ratio.

Table 3.11 P/F ratios from birth histories by region, Mozambique 1972-1997

Age at	Period before the survey (years)				
Survey	0-4	5-9	10-14	15-19	20-24
Mozambique					
20-24	1.191	1.180	0.956	1.168	0.854
25-29	1.099	1.044	1.046	0.980	0.535
30-34	1.089	1.059	0.991	0.659	
35-39	1.164	1.024	0.733		
40-44	1.152	0.793			
45-49	0.927				
Northern Region					
20-24	1.091	1.231	0.806	1.049	0.958
25-29	1.195	1.066	0.855	0.888	0.478
30-34	1.192	0.981	0.809	0.578	
35-39	1.219	0.878	0.586		
40-44	1.110	0.652			
45-49	0.829				
Central Region					
20-24	1.189	1.025	1.152	1.143	0.831
25-29	1.020	0.982	1.130	1.001	0.483
30-34	1.038	1.035	0.969	0.715	
35-39	1.146	0.943	0.794		
40-44	1.089	0.810			
45-49	1.002				
Southern Region					
20-24	1.099	1.034	1.081	1.064	0.904
25-29	1.082	1.176	1.057	0.990	0.473
30-34	1.209	1.174	1.063	0.635	
35-39	1.240	1.221	0.771		
40-44	1.329	0.945			
45-49	1.077				

Source: Computed from 1997 DHS.

3.3.4 Trends in parity progression

In the above analyses aggregate measures were used to assess trends in period fertility. However, such measures do not distinguish the effect of family size limitation from the temporary effects of changes in age at marriage and length of birth intervals (Collumbien et al. 1997:10). Since trends in fertility reflect changes in both the pace and quantum of reproduction (Collumbien et al. 1997), it is important to assess changes that are due to behavioural change. To detect a decline in family size resulting from the adoption of birth control within unions, parity-specific measures should be examined. A good measure for such a task is the Parity Progression Ratio (PPR), defined as the proportion of women who having had *n* births go on to have *n*+1 births. However, it can only be calculated precisely for cohorts of completed fertility. In order to investigate recent trends in fertility it is necessary to estimate parity progression ratios for cohorts of women who are still in the reproductive ages. Since parity progression ratios cannot be measured when fertility is incomplete, B_{60}, the proportion of women moving on to the next order within 60 months or 5 years (Rodriguez and Hobcraft 1980), is used instead in this analysis. B_{60}, or the censored parity progression ratio, is a good approximation of the parity progression ratio because only a small proportion of births occurs more than 5 years after the previous birth (Brass and Juarez 1983:6; Collumbien et al. 1997:10-11). However, B_{60} is subject to two types of bias caused by the nature of incomplete birth histories: censoring and selectivity (Rodriguez and Hobcraft 1980).

The censoring problem is caused by the truncation of births to women in reproductive ages by the date of the interview. Because exposure to childbearing is cut off by the date of the interview, there is an ambiguity in the definition of the parity progression ratios and the birth intervals (Rodriguez and Hobcraft 1980:8). This problem is overcome by applying life table analysis to births of each order, which has the advantage of adjusting the population at risk, that is, the number of women of incomplete fertility who have experienced *n* births at different intervals before the survey (Rodriguez and Hobcraft 1980:8; Brass and Juarez 1983:5; Muhwava and Timæus 1996:34).

The second bias in B_{60} is caused by selection for the speed of reproduction in the young cohorts of women. This bias arises because women who will ultimately progress to the next birth order, but at a slower pace than average, will tend to be excluded from the calculation to a greater extent than women who progress at a faster pace, leading to estimates of B_{60} that are too high (Rodriguez and Hobcraft 1980:8; Brass and Jolly 1993:73). To adjust for this bias, the truncation approach (Brass and Juarez 1983) was applied. The procedure derives indices of relative change by comparing B_{60} for successive pairs of age cohorts after truncating the fertility experience of the older cohort by 5 years to render it comparable with the younger one. Thus, the adjusted B_{60}s are derived by the multiplication of the oldest cohort by the index of relative change from 45-49 to 40-44, and repeating the process to obtain the B_{60}s for each of the younger age cohorts (Brass and Juarez 1983; Brass and Jolly 1993; Brass, Juarez and Scott 1995; Collumbien et al. 1997).

Table 3.12 Adjusted censored parity progression ratios by age of women and region, Mozambique, 1997 DHS

Age at	Progression from parity i to i+1							
Survey	1 to 2	2 to 3	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9
Mozambique								
15-19	0.672							
20-24	0.872	0.785	0.764					
25-29	0.889	0.878	0.813	0.791	0.832	0.677		
30-34	0.970	0.904	0.883	0.791	0.781	0.780	0.794	0.757
35-39	0.958	0.921	0.946	0.903	0.875	0.765	0.670	0.680
40-44	0.999	0.989	0.937	0.899	0.898	0.833	0.800	0.727
45-49	0.949	0.963	0.954	0.920	0.896	0.860	0.837	0.743
Northern Region								
15-19	0.725							
20-24	0.879	0.766	0.863					
25-29	0.883	0.885	0.837	0.765	0.835			
30-34	0.955	0.961	0.907	0.781	0.716	0.772		
35-39	0.958	0.880	0.942	0.924	0.899	0.798	0.814	
40-44	0.977	0.943	0.914	0.951	0.894	0.902	0.896	0.839
45-49	0.936	0.968	0.951	0.883	0.892	0.832	0.847	0.739
Central Region								
15-19	0.309							
20-24	0.892	0.882	0.670					
25-29	0.932	0.913	0.859	0.793	1.005			
30-34	0.973	0.917	0.896	0.788	0.898	0.764		
35-39	0.989	0.958	0.955	0.920	0.949	0.771	0.560	
40-44	1.003	0.994	0.957	0.872	0.872	0.861	0.842	0.893
45-49	0.983	0.975	0.962	0.946	0.926	0.882	0.827	0.778
Southern Region								
15-19	0.688							
20-24	0.842	0.653						
25-29	0.846	0.820	0.705	0.820				
30-34	0.976	0.857	0.852	0.791	0.674	0.810		
35-39	0.928	0.911	0.934	0.872	0.778	0.724	0.650	
40-44	0.999	1.010	0.931	0.889	0.918	0.777	0.720	0.495
45-49	0.934	0.948	0.950	0.926	0.873	0.857	0.834	0.714

Source: Computed from 1997 DHS.

Table 3.12 presents the adjusted censored parity progression ratios (adjusted B_{60}s) estimated using incomplete birth histories from the 1997 DHS for the whole country and for the three regions. Progression ratios were not estimated at provincial level because of small sample size. The national and regional estimates are for progressions from the first to second birth up to the eighth to ninth birth, and are also presented in a series of graphs (see Appendix Figures C3.4.1-2). Trends from these ratios should be interpreted with some caution, since they may be subject to the effects of age misreporting and small numbers of women in some individual cells.

The national progression ratios are close to 95 per cent at low birth orders for the oldest cohort (aged 45-49), declining to between 80 and 90 per cent for progressions from parities five to eight, with a further decrease to around 75 per cent for the progression to ninth birth. Overall, and consistent with the regional pattern of TFR, the highest parity progression ratios are found in Central Region and the lowest in Southern Region. For example, 88 per cent of women 20-24 in Central Region had a third birth, against 77 per cent in Northern and 65 per cent in Southern Regions.

Inspection of progression ratios by cohort of women shows a generally decreasing trend in progression from older to younger cohorts. The reductions in the ratios are greater at higher birth orders. For instance, the progression to the second birth for women 25-29 (0.889) is 6 per cent lower than that for women 45-49 (0.949) and for the progression to the fourth birth the difference is even larger, 15 per cent. However, greater reductions at the higher orders may not necessarily mean that family restriction is more severe at higher orders than lower orders, since the measures are for different time periods (Brass et al. 1995:3). The progression from first to second birth for women aged in their forties at the time of the survey took place many years before the progression from first to second birth for women in their twenties. Thus, trends in the progression from first to second birth for the youngest age group may be comparable with trends in the higher progressions for the older age group, and the difference in the strength of these trends may therefore be due to acceleration over time rather than the effect of family size (Brass et al. 1995:3).

Table 3.13 Adjusted censored parity progression ratios and percentage change by time period and region, Mozambique, 1997 DHS

Progression	Years preceding the survey								
i to i+1:	0	$\%_0\Delta_5$	5	$\%_5\Delta_{10}$	10	$\%_{10}\Delta_{15}$	15	$\%_{15}\Delta_{20}$	20
Mozambique									
1 to 2	0.872	*-1.9*	0.889	*-8.3*	0.970	*1.2*	0.958	*-4.1*	0.999
2 to 3	0.832	*-6.6*	0.891	*-2.4*	0.913	*-4.5*	0.955	*-2.1*	0.976
3 to 4	0.813	*-8.0*	0.883	*-6.6*	0.946	*1.0*	0.937	*-1.8*	0.954
4 to 5	0.791	*-6.6*	0.847	*-6.0*	0.901	*-0.9*	0.909		
5 to 6	0.781	*-10.8*	0.875	*-2.5*	0.898	*0.2*	0.896		
6 to 7	0.773	*-3.3*	0.799	*-5.6*	0.846				
7 to 8	0.670	*-16.3*	0.800	*-4.4*	0.837				
Northern Region									
1 to 2	0.879	*-0.5*	0.883	*-7.5*	0.955	*-0.3*	0.958	*-2.0*	0.977
2 to 3	0.826	*-10.5*	0.923	*0.3*	0.920	*1.0*	0.911	*-4.6*	0.955
3 to 4	0.837	*-7.7*	0.907	*-3.7*	0.942	*3.0*	0.914	*-3.8*	0.951
4 to 5	0.773	*-9.3*	0.852	*-9.1*	0.937	*2.2*	0.917		
5 to 6	0.716	*-20.3*	0.899	*0.5*	0.894	*0.2*	0.892		
6 to 7	0.785	*-7.7*	0.850	*-1.9*	0.867				
7 to 8	0.814	*-9.2*	0.896	*5.9*	0.847				
Central Region									
1 to 2	0.892	*-4.3*	0.932	*-4.2*	0.973	*-1.6*	0.989	*-1.4*	1.003
2 to 3	0.898	*-1.9*	0.915	*-2.4*	0.937	*-3.9*	0.976	*-0.9*	0.984
3 to 4	0.859	*-4.1*	0.896	*-6.1*	0.955	*-0.2*	0.957	*-0.5*	0.962
4 to 5	0.791	*-7.4*	0.854	*-4.7*	0.896	*-1.4*	0.909		
5 to 6	0.898	*-5.4*	0.949	*8.8*	0.872	*-5.9*	0.926		
6 to 7	0.768	*-5.9*	0.816	*-6.4*	0.871				
7 to 8	0.560	*-33.5*	0.842	*1.8*	0.827				
Southern Region									
1 to 2	0.842	*-0.4*	0.846	*-13.4*	0.976	*5.2*	0.928	*-7.1*	0.999
2 to 3	0.737	*-12.2*	0.839	*-5.1*	0.884	*-7.9*	0.961	*-1.9*	0.979
3 to 4	0.816	*-4.2*	0.852	*-8.8*	0.934	*0.3*	0.931	*-2.0*	0.950
4 to 5	0.805	*-3.2*	0.832	*-5.6*	0.881	*-3.0*	0.908		
5 to 6	0.802	*-2.0*	0.818	*-10.9*	0.918	*5.2*	0.873		
6 to 7	0.767	*-3.2*	0.792	*-3.0*	0.817				
7 to 8	0.650	*-9.8*	0.720	*-13.7*	0.834				

Note: %Δ denotes percentage change.
Source: Computed from 1997 DHS.

Regional comparisons of the trend in the progression ratios suggest a more pronounced pattern of decline in Southern Region. For instance, the progression from third to fourth birth for cohort 25-29 is 26 per cent lower than that for cohort 45-49 in the Southern, 11 per cent in Central and 12 per cent in Northern Region. This suggests a greater fertility decline due to deliberate control in Southern Region than in Central and Northern Regions, which is consistent with the trends shown by the analysis of period measures and contraceptive prevalence rates (see Chapter 8). However, in all regions the progression ratios show some fluctuation which may be related to sampling errors and/or reporting errors.

Table 3.13 presents adjusted censored parity progression ratios by time period. Consistent with earlier evidence, these values indicate that changes in parity progression ratios more than ten years before the survey were small and varied in direction. Evidence of decline in parity progression ratios is seen from the late 1980s, which seems consistent with the conclusion by Brass et al. (1995:6) that the transition to lower fertility through family limitation became widespread in sub-Saharan Africa in the 1980s. Brass et al. (1995:6) found that in most countries there was a correlation between reductions in parity progression ratios and increased contraception.

The reduction in parity progression ratios seems to occur at the same pace across all age groups and birth orders, which is, once again, consistent with the prediction by Caldwell et al. (1992:220). The apparent high speed of decline in the last five years before the survey for the progressions to sixth and eighth births (Mozambique), third and sixth births (Northern Region), seventh birth (Central Region), and third birth (Southern Region) may be due to erratic values. According to Brass et al. (1995:4), it would be expected that reductions in the higher parity progressions would be established earlier in time, but there is no evidence of this in Mozambique.

3.4 Conclusion

The objective of this chapter was to estimate fertility levels, patterns and trends at national, regional and provincial levels. Several methods were used to assess the national as well as regional and provincial fertility levels and trends. The estimates obtained by the application of different indirect techniques are consistent with one another, but there are small differences caused by differences in the assumptions and different sensitivities to reporting errors, especially for 1980 where both omission of CEB and age misreporting were high. The P/F ratio method overestimated fertility mainly through the combined effect of changing fertility and the misperception of the reference period of one year before the censuses. The RGM estimates are the most reliable because the method does not assume constant fertility in the recent past, and estimates are based on a wider age range than the P/F ratio.

The TFR in Mozambique remained at between 6 and 7 children per women from 1950 to 1970, increasing from 6.6 in 1970 to 7.1 in 1980, probably due to a decline in the prevalence of pathological infertility resulting from reduction in venereal diseases. The TFR was estimated in this analysis to have dropped from 7.1 births per woman in 1980 to 6.1 births per woman in 1997. The corresponding TFRs for 1980 and 1997 by region are 6.7 and 6.4 for Northern Region, 7.9 and 6.7 for Central Region, and 6.2 and 5.1 for Southern Region. These figures suggest a fertility decline between 1980 and 1997 of 14 per cent for Mozambique, and of 5, 14 and 17 per cent for Northern, Central and Southern Regions, respectively. These declines are, however, refuted by both DHS birth history and census-reconstructed birth history analyses, which show a fertility decline only in Southern Region. Thus, while fertility decline is well established in the Southern Region, especially in Maputo City and Maputo Province, there are still doubts about the trends in the other two regions, and for the whole country.

The evidence of fertility decline in Southern Region shows that the decline has been occurring across all age groups and birth orders, which is consistent with that observed in other sub-Saharan countries and with Caldwell et al.'s (1992:220) prediction of an African fertility transition different from that which occurred in Asia and Latin America, where the narrowing of the age pattern accompanied the decline. It also appears to have started in the late 1980s for Southern Region and later (if at all) in the other two regions.

Chapter 4

REGIONAL, PROVINCIAL AND SOCIO-ECONOMIC DIFFERENTIALS IN FERTILITY

4.1 Introduction

The previous chapter applied indirect techniques to estimate fertility levels and patterns. This chapter draws on those estimates and examines provincial and socio-economic differentials in fertility. The effects of province of residence, education, employment status, urban-rural residence, marital status, religion and ethnicity on fertility are examined on a bivariate and multivariate basis. The fertility levels used in the bivariate analysis were estimated by the Relational Gompertz Model (RGM), which was considered in the previous chapter to provide the most reliable estimates.

The chapter is divided into four sections. In Section 4.2 regional and provincial variations in fertility levels are examined at the aggregate level, that is, provincial-level socio-economic and demographic characteristics are related to the TFR to determine the degree of association. Section 4.3 discusses the relationship between women's socio-economic and cultural characteristics and TFR at the individual level. The net effect of each of the socio-economic factors on lifetime and current fertility is then assessed using a multivariate framework in Section 4.4; Section 4.5 provides some concluding remarks.

4.2 Regional and provincial variation in fertility

Many studies have shown that regional variations in fertility and socio-economic diversity are related. Women living under different social and economic conditions tend to exhibit different levels of fertility, and those living in areas that are similar in terms of socio-economic characteristics tend to have similar norms and attitudes regarding childbearing resulting in similar levels of fertility (Coward 1986; Wood and de Carvalho 1988). Individual fertility behaviour depends not only on personal characteristics, but also on constraints imposed by the conditions that are particular to the region or province of residence (Billy and Moore 1992; Courgeau and Baccaïni 1998; Hank 2001b). These conditions can create an opportunity structure that affects the woman's costs of engaging, or not engaging, in a particular type of fertility behaviour, and can raise social norms that influence the psychic costs and preferences for engaging in various reproductive behaviours by defining the boundaries of permissible or desirable behaviour (Billy and Moore 1992:980). Since many fertility-related decisions are in the individual, rather than the public domain, the degree to which aggregate structural and normative conditions will affect fertility depends on the individual internalisation of regional conditions and norms (Billy and Moore 1992). Therefore, both regional/provincial factors and differences in the geographic distribution of individual characteristics are related to the observed regional and provincial differences in fertility.

To take into account both provincial and individual effects, this chapter performs separate analyses for aggregate (provincial) and individual data. First, regional and provincial variations of total fertility rate are discussed at the aggregate level. This discussion begins by describing the pattern of regional and provincial variation in TFR as estimated from the 1980 and 1997 Censuses (Subsection 4.2.1), and then discusses the socio-economic factors associated with the observed provincial variation (Sub-section 4.2.2). The individual-level analysis of provincial and socio-economic differentials is performed in Sections 4.3 and 4.4.

4.2.1 Variation in fertility levels

As seen in Table 4.1, TFR shows substantial differences among regions and provinces. Fertility is highest in Central Region, intermediate in Northern and lowest in Southern. This regional pattern is consistent with earlier reports (Heisel 1968). For instance, the analysis of the 1950 Census reported average parities of women aged 45-49 of 3.7 in Northern, 5.1 in Central and 3.2 in Southern Region (Heisel 1968:Table 8.6). Although these figures may be seriously under-reported, the regional pattern was considered correct and is consistent with that shown in Table 4.1.

Table 4.1 also presents the relative deviation of the TFR for each region and province, in relation to the national average. While in 1980 the TFRs of Southern and Northern Regions were below the average, in 1997 only Southern Region had its TFR lower than the national average. The TFR of Northern Region was 5 per cent lower in 1980 but 6 per cent higher than the national average in 1997, while the TFR of Central Region was 11 per cent higher than the national TFR in both the 1980 and 1997 Censuses.

Table 4.1 Relative deviations in TFR by region and province, Mozambique 1980 and 1997 Censuses

Region/Province	1980			1997		
	TFR	% deviation from national TFR	% deviation from regional TFR	TFR	% deviation from national TFR	% deviation from regional TFR
Northern	**6.7**	**-5.3**		**6.4**	**5.7**	
Niassa	7.5	5.9	11.7	6.7	10.6	4.7
Cabo Delgado	6.6	-6.9	-1.7	5.8	-4.5	-9.6
Nampula	6.6	-7.4	-2.2	6.4	5.6	-0.1
Central	**7.9**	**10.9**		**6.7**	**10.9**	
Zambézia	8.4	18.0	6.4	6.7	10.0	-0.7
Tete	7.9	11.0	0.0	7.1	17.4	5.9
Manica	7.5	6.1	-4.3	6.5	6.4	-4.1
Sofala	7.0	-0.6	-10.4	5.8	-5.2	-14.4
Southern	**6.2**	**-13.3**		**5.1**	**-15.5**	
Inhambane	6.0	-15.5	-2.6	5.3	-13.0	2.9
Gaza	6.4	-9.5	4.4	5.4	-11.2	5.0
Maputo Province	6.2	-13.3	0.0	4.8	-21.2	-6.7
Maputo City	5.8	-18.1	-5.5	3.9	-36.6	-25.0
Mozambique	**7.1**			**6.1**		

Source: See Table 3.6, RGM estimates.

The provinces of Zambézia (in 1980) and Tete (in 1997) recorded the highest TFR whereas Maputo City recorded the lowest in both censuses. The fertility range (difference between the highest and the lowest TFR) increased from 2.6 births per woman in 1980 to 3.2 in 1997, mainly owing to the decline in Maputo City. There were larger deviations in 1997 (-36.6 to +17.4) than in 1980 (-18.1 to +18.0) reflecting the fact that by 1997 fertility was already declining in Southern Region, particularly in Maputo Province and Maputo City, but not in the Northern and Central Regions (see Chapter 3).

Also presented in Table 4.1 are the relative deviations of provincial TFRs from the regional average. Overall, there is greater inter-regional than intra-regional range. In 1997, for instance, while the difference between the highest provincial TFR (Tete) and the lowest (Maputo City) is 3.2 children per woman, the corresponding ranges within regions are 0.9 in Northern, 1.3 in Central and 1.5 children per woman in Southern Region.

4.2.2 Factors associated with provincial variation in fertility

The 'classical' demographic transition theory (Davis 1945; Notestein 1945) postulates that fertility decline is driven by economic development (modernisation). Economic development creates the conditions that induce fertility decline by changing the economics of childbearing such that a larger number of children becomes disadvantageous to parents (Leibenstein 1974, 1975). The level of urbanisation, female literacy and participation in the non-agricultural labour force and the use of modern contraceptive methods increase as the society modernises (Leibenstein 1974, 1975). There is also a sustained reduction in infant mortality and an attenuation of the extended family system (Leibenstein 1975; Chesnais 1992). Women in more prosperous provinces are exposed to conditions that favour low fertility, such as an industrial occupational structure with better schooling and employment opportunities outside the home, availability of health and family planning services, multiples channels through which information, ideas, and social influence flow, and greater exposure to many other aspects of modernisation and development (Cochrane 1983; Singh and Casterline 1985; Bongaarts and Watkins 1996; Singh and Samara 1996); so one would expect more economically developed provinces to exhibit lower fertility than the less developed.

Empirical research in both developing countries (Henin and Mwobobia 1982; Coward 1986; Wood and de Carvalho 1988; VanderPost 1992; Lucas et al. 1996; Akkerman and He 1998; Lucas and Jhamba 1999; Weeks et al. 2000) and developed countries (O'Connell 1981; Watkins 1990, 1991; Morrill 1993; Hank 2001a) shows that uneven development and cultural diversity within countries are associated with fertility variation. For instance, Coward (1986:56) found that in 1970 in Trinidad and Tobago, female educational attainment and ethnicity explained about 77 per cent of the regional variation in the general fertility rate. More recently, Weeks et al. (2000) found that the variation in fertility among villages in Egypt was related to the proportion of women married, the female illiteracy rate and the adult sex ratio. An analysis of 172 regions of 32 sub-Saharan African countries by Tabutin and Schoumaker (2001) revealed that infant mortality, female education, economic development and urbanisation were the most important factors in explaining regional differences of fertility. Similarly, in West Germany in the 1990s, the differences in population density, family migration and occupational structure were associated with regional total fertility rates (Hank 2001a).

To evaluate the degree to which uneven socio-economic development and cultural contexts are related to provincial variation of fertility in Mozambique, this section examines the relationship between provincial proximate determinants and socio-economic indicators (see

Appendix Table D4.1) and TFR. The association is examined by applying correlation. Table 4.2 lists the variables used in the analysis.

Table 4.2 List of the variables used in the analysis of provincial differences in fertility

Proximate determinants	Socio-economic indicators
Singulate mean age at marriage[a]	Human development index 1998[c]
% married women in polygyny[b]	Gross domestic product per head 1998 [c]
Median duration of breastfeeding[b]	Human poverty index (HP-1) 1997 [c]
Median duration of abstinence[b]	Female literacy rate[a]
%women 45-49 childless[a]	Gender disparity in literacy index[a]
Contraceptive prevalence rate[b]	% women in agriculture[a]
	% women in modern sector[a]
	% urban population[a]
	Number of beds per 10 000 women 15-49[d]
	% under 3 years old underweight 1997 [c]
	Life expectancy at birth[e]
	Under five mortality rate[e]

Sources: a Computed from 1997 Census; b Computed from 1997 DHS; c Mozambique (1999); d INE (1999c); e INE (1998c:Table 3.1).

(a) The proximate determinants

Table 4.3 presents the Pearson correlation coefficients indicating the degree of association between each of the proximate determinants and TFR at the provincial level. The plots of each proximate determinant against TFR are presented in Figure 4.1. The TFR is negatively related to the singulate mean age at marriage (SMAM), contraceptive prevalence rate, percentage of women aged 45-49 who are childless and median duration of postpartum abstinence; it is positively related to percentage of married women in polygynous unions and median duration of breastfeeding. However, only SMAM, median duration of breastfeeding and contraceptive prevalence rate have a statistically significant correlation at the 5 per cent level.

The association between SMAM and TFR is strong (R^2=0.65), but this does not hold within Northern Region (see Figure 4.1). Provinces with low SMAM tend to have high fertility and vice versa. In the Southern provinces of Inhambane, Gaza, Maputo Province and Maputo City where SMAM is higher than 20 years, TFR is less than 5.5 births per woman. In contrast, in Central and Northern Regions where SMAM is less than 19 years the TFR is 6 or more in most provinces. It is important, however, to note that although in the Northern provinces SMAM is less than 16 years, two years less than in Central, TFR is lower in the former than in the latter. As discussed below, this may be due to high prevalence of infertility in the Northern Region (see Chapter 7).

Table 4.3 Pearson correlation coefficients between proximate determinants and total fertility rate, Mozambique 1997

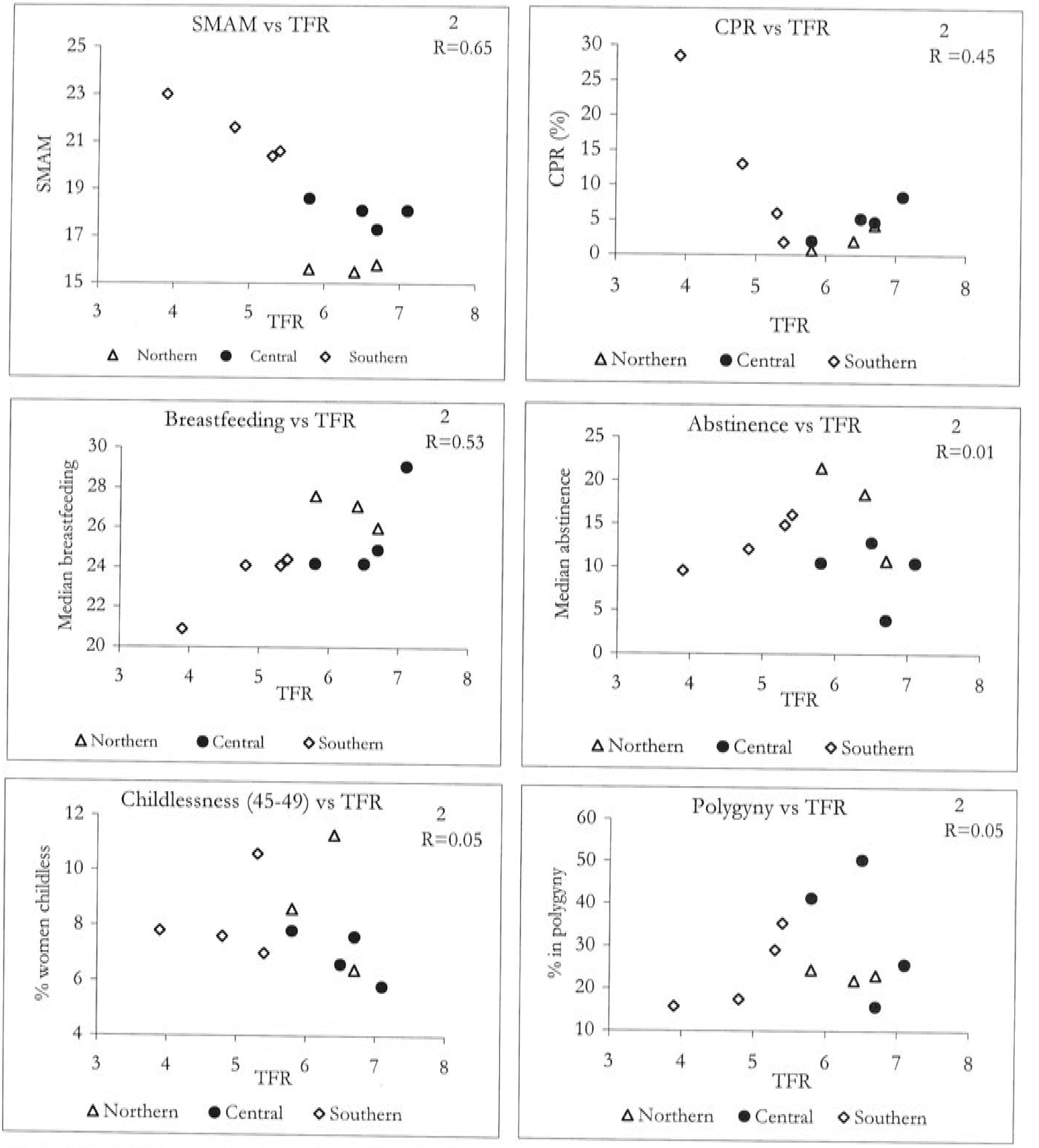
Proximate determinant	Correlation coefficient	R-squared
Singulate mean age at marriage	-0.809**	0.654
% married women in polygynous unions	0.230	0.053
Median duration of breastfeeding	0.731*	0.534
Median duration of abstinence	-0.106	0.011
% women 45-49 childless	-0.227	0.052
Contraceptive prevalence rate	-0.673*	0.453

Note: *p≤ 0.05; **p≤0.01.

Table 4.3 also shows a positive association, although very weak (R^2=0.05) and not statistically significant at the 5 per cent level, between the percentage of married women in polygynous marriages and TFR. Although at the individual level polygyny appears to depress fertility (Muhsam 1956; Bean and Mineau 1986; Pebley and Mbugua 1989; Hern 1992; Effah 1999), at the aggregate level a positive association is expected (Ezeh 1997). Polygyny tends to maximise the time women are exposed to the risk of childbearing by facilitating marriage at an early age and quick remarriage of widows and divorcees (Garenne and van de Walle 1989; Ezeh 1997; Makinwa-Adebusoye 2001). As a result, women in high-polygyny societies, both monogamous and polygynous, tend to have higher fertility than in low-polygyny societies (Ezeh 1997:365). The results in this analysis, although weak, are consistent with this expectation and with a study in Kenya by Ezeh (1997) which found that high-polygyny regions had higher fertility that low-polygyny regions.

Variation in the length of the period of breastfeeding and postpartum sexual abstinence may also contribute to variations in fertility (see Tabutin and Schoumaker 2001). Since women are not at risk of another conception while still amenorrhoeic or abstaining from sexual intercourse, the duration of this period is a very important fertility-inhibiting factor, especially in sub-Saharan Africa where durations are longer than in any other region of the world (Tabutin and Schoumaker 2001; United Nations 2001a). As shown in Table 4.3 the coefficients suggest a fairly strong (R^2=0.53) positive association between the duration of breastfeeding and TFR (once again, this does hold within Northern Region), and a very weak (R^2=0.01) negative relationship between abstinence period and TFR. The shortest durations of postpartum abstinence are in Central Region (see Chapter 6) where fertility is the highest. For instance, Zambézia, which recorded the highest TFR in 1980 and second highest 1997, has the shortest (median equal to 4 months) duration of postpartum abstinence. Conversely, Cabo Delgado, with the longest abstinence period (median equal to 22 months) has a lower TFR than one would expect from its socio-economic indicators.

Figure 4.1 Plots of the proximate determinants against total fertility rate



Note: SMAM= Singulate mean age at first marriage; TFR= total fertility rate; CPR= contraceptive prevalence rate.

Infertility has been described as one of the most important determinants of fertility in sub-Saharan Africa (Frank 1983; Mammo and Morgan 1986; Larsen 2000). Some studies elsewhere in sub-Saharan Africa have singled out infertility as one of the explanatory factors for inter-country and within-country fertility variations (Frank 1983; Mammo and Morgan 1986). A study of 18 sub-Saharan countries found that infertility accounted for about 60 per cent of the variation in TFR (Frank 1983:140); in Ethiopia 40 per cent of the provincial variation in fertility could be explained by infertility (Mammo and Morgan 1986:540). Lucas and Jhamba (1999) also found an association between infertility and provincial variation in fertility in Zambia.

In this analysis, the prevalence of infertility, as measured by the percentage of women 45-49 who are childless, depresses fertility and explains about 5 per cent of the provincial variation in the TFR. Although the relationship is weak and not statistically significant at the 5 per cent level, the regional pattern of childlessness seems to match the actual regional pattern of TFR. The TFR is highest in the Central Region where the percentage of women aged 45-49 who are childless is lowest. Similarly, fertility is relatively low in Northern and Southern Regions where the prevalence of infertility is high. For example, Cabo Delgado, Nampula and Inhambane, the provinces with the highest prevalence of infertility (see Chapter 7), all exhibit lower fertility than the provinces with similar socio-economic and cultural characteristics, within their regions.

Fertility transitions observed in developing countries have largely been achieved by increased fertility regulation within marriages, through the use of contraception and abortion (Cohen 1998). The decline of fertility in Latin America, Asia and in some sub-Saharan countries has been driven by increased contraceptive use (see Casterline 1994; Guzman 1994; Guilkey and Jayne 1997; Kirk and Pillet 1998; Sibanda 1999; Kaufman 2000). Some studies have indicated that differences in levels of contraceptive use explain as much as 92 per cent of the variation in fertility (Mturi and Hinde 2001:10-5). For Mozambique the expectation was that provinces with a high contraceptive prevalence rate would also exhibit low fertility. As shown in Table 4.3, this expectation was confirmed with contraceptive use explaining 45 per cent of the variation in TFR, which is consistent with findings for sub-Saharan Africa by Tabutin and Schoumaker (2001:Figure 3), where contraceptive use explained 56 per cent of the variation, and Lucas and Jhamba (1999) for Zambia. However, Figure 4.1 shows that in Mozambique this association is not negative in Northern and Central regions, and is heavely weighted by Maputo City.

(b) Socio-economic development

The correlation coefficients between socio-economic development indicators and TFR are presented in Table 4.4. Plots of selected socio-economic indicators against TFR are also presented in Figure 4.2. Overall, the expectation that more prosperous provinces would have lower fertility than the more disadvantaged ones was confirmed. The United Nations Human Development Index (HDI), a combination of life expectancy, educational attainment and Gross Domestic Product (GDP) per head, is negatively associated with TFR (R^2=0.64). The provinces with high HDI scores have lower fertility than those with low HDI scores. All the HDI components are significantly associated with fertility in their own right. Of these components GDP per capita provides the weakest association explaining only 48 per cent of the variation compared with 79 per cent for literacy rate and 70 per cent for life expectancy. The association between GDP per capita is even weaker (R^2=0.06) when Maputo City is omitted from the analysis. It has been suggested that reproductive behaviour, fertility in particular, responds more to the social change and transformation of lifestyles implicit in modernisation (United Nations 2001a:1-5) than to economic growth that does not provide uniform social consequences, especially under conditions of high inequality (Gallagher, Stokes and Anderson 1996:229). According to Gallagher et al. (1996) under conditions of high inequality economic growth (as measured by GDP alone) may fail to involve more people in the modern sector of the economy, which would create the family-level conditions that make fewer children a rational preference.

Table 4.4 Pearson correlation coefficients between socio-economic indicators and total fertility rate, Mozambique 1997

Socio-economic indicators	Correlation coefficient	R-squared
Human development index 1998	-0.798**	0.637
Gross domestic product per head 1998	-0.696*	0.484
Human poverty index (HPI) 1997	0.888**	0.788
Female literacy rate	-0.890**	0.792
Gender disparity in literacy index	-0.790**	0.624
% women in agriculture	0.817**	0.667
% women in modern sector	-0.823**	0.677
% urban population	-0.822**	0.675
Number of beds per 10,000 women 15-49	-0.800**	0.640
% under 3 years old underweight 1997	0.788**	0.621
Life expectancy at birth	-0.839**	0.704
Under five mortality rate	0.799**	0.638

Note: *$p \leq 0.05$; **$p \leq 0.01$.

The HDI is a measure of overall socio-economic development and has been found to be negatively, and strongly, correlated with the TFR in inter-country comparative studies

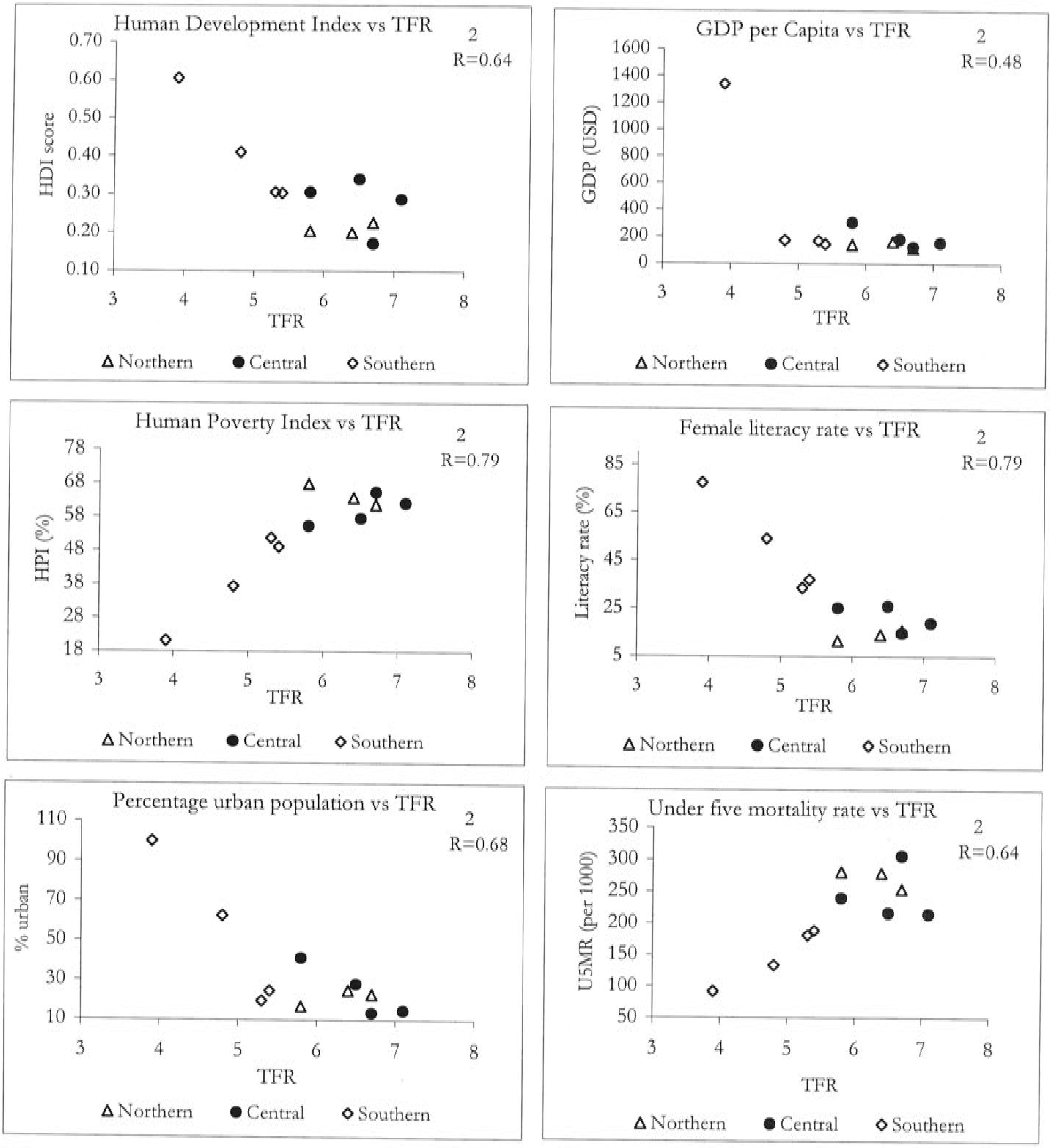
(Bongaarts and Watkins 1996; United Nations 2001a). However, analyses within countries found that such a negative association has not always been significant. For example, Lucas and Jhamba (1999) did not find a significant association between HDI and fertility in Zambia although HDI was positively associated with the contraceptive prevalence rate.

Table 4.4 shows that the Human Poverty Index (HPI), a measure of the degree to which people have access to education, health and other basic needs, has a strong (R^2=0.79) positive association with TFR. The low-fertility provinces of Southern Region have relatively low levels of HPI compared with the provinces in Central and Northern Regions.

Female literacy, found to have the biggest effect in many studies (Coward 1986; Weeks et al. 2000; Ahituv 2001), also shows the strongest association here, explaining 79 per cent of the provincial variation in TFR. Another indicator of education, which is important to fertility behaviour, is the Gender Disparity in Literacy Index (GDLI) (Jejeebhoy 1995), the number of literate women aged 15 and over per 1000 literate men aged 15 and over. This index measures the degree to which the society is gender-stratified. Low values indicate a high level of disadvantage for women in comparison with men, that is, high gender-stratification, and high values indicate that women are less disadvantaged in relation to men. In Mozambique highly gender-stratified provinces tend to have higher fertility than gender-egalitarian ones (R^2=0.62).

Low living standards are associated with high mortality, especially infant and child mortality, which in turn has a positive association with fertility. Indeed, demographic transition theory states that high fertility and high mortality are characteristic of the pre-industrialisation stage of development (Chesnais 1992). As a society modernises there is a decline in mortality that is followed by a decline in fertility. The results in this analysis seem to confirm this proposition. Under five mortality is positively related to TFR (see Figure 4.2) and explains 64 per cent of the provincial variation of TFR. However, the association holds only in Southern Region, as provincial differences in both TFR and under-five mortality in Northern and Central Regions are small (see Figure 4.2). According to Makinwa-Adebusoye (2001:12-4) the theoretical link between childhood mortality and fertility is that increases in child survival may induce a decline in the propensity to 'hoard' or 'replace' children, the known mechanisms used by couples in high mortality settings to ensure that they obtain the desired family size. Child survival may inhibit fertility by lengthening birth intervals, which would be shortened in the case of an early death of the child (Palloni and Rafalimanana 1999).

Figure 4.2 Plots of selected socio-economic indicators against total fertility rate



Note: TFR= total fertility rate; GDP= gross domestic product.

4.3 Socio-economic determinants of fertility: an individual bivariate analysis

4.3.1 Education and fertility

The relationship between education and fertility is very complex and the mechanisms through which education affects fertility are not fully understood. Empirical research shows that educated women, especially those with secondary education, have lower fertility than their uneducated counterparts (Cochrane 1979, 1983; Jejeebhoy 1995; Jeffery and Basu 1996; Heaton and Forste 1998; Diamond, Newby and Varle 1999; Eloundou-Enyegue 1999). An inverse relationship between fertility and education has also been found in some studies in Mozambique (Lopes and Santos 1995a, b, 1996; Gaspar et al. 1998; Mazive 1999). Theoretically, most of the depressing effect of education on fertility is indirect, operating through education's influence on factors that have a direct effect on fertility. Thus, education delays women's marriage; increases women's ability to influence decisions concerning their lives including the use of contraception; exposes women to new ideas from the outside world, which opens the door to socio-economic advancement, allowing them to gain cash employment and enhance their position in the community and their negotiating power in the household (Holsinger and Kasarda 1976; Cochrane 1979, 1983; Caldwell 1980; Mahmud and Johnston 1994; Jejeebhoy 1995; Cleland and Jejeebhoy 1996; Jeffery and Basu 1996; Basu 1999; Diamond et al. 1999; Eloundou-Enyegue 1999). Education reduces the domestic control of elder relatives and promotes a more egalitarian relationship with husbands, enabling women to pursue their own goals and seek and use information on family planning; it enhances women's economic and social self-reliance, making them less likely to want a large number of children, or sons, to provide economic support in old age or legitimise their position in the husband's family; it reduces infant and child mortality, providing educated women with more confidence in the survival of their children, hence not inflating their family size to ensure that some of their children survive (Holsinger and Kasarda 1976; Cochrane 1979, 1983; Caldwell 1980; Mahmud and Johnston 1994; Jejeebhoy 1995; Cleland and Jejeebhoy 1996; Jeffery and Basu 1996; Heaton and Forste 1998; Basu 1999; Carter 1999; Diamond et al. 1999; Eloundou-Enyegue 1999; Glewwe 1999; Kinfu Ashagrea 2001). Thus, a negative relationship between education and TFR is expected. The estimated TFRs by educational level for Mozambique in 1980 and 1997 are presented in Table 4.5. For 1997 the estimates are also presented by region.

Table 4.5 Total fertility rate by educational level, Mozambique 1980 and 1997

Educational level	1980 Mozambique	1997 Mozambique	Northern	Central	Southern
No education	7.1	6.3	6.3	6.8	5.5
Primary	6.8	5.9	7.0	6.8	5.0
Secondary or higher	4.2	2.7	3.6	3.3	2.4

Source: Author's RGM estimates from 1980 and 1997 Censuses.

As can be seen from Table 4.5, in both censuses women with no education and those with primary education exhibited very little difference in TFR (less than 10%), but the fertility of women with secondary or higher education in 1997 was about 50 per cent of those with primary or no education. This relationship is typical of populations with low levels of literacy, especially in sub-Saharan Africa, where a small amount of education may have a positive effect, no effect at all, or a weak negative effect on fertility (Jejeebhoy 1995), due to its effect in reducing infertility and the duration of breastfeeding and postpartum sexual abstinence.

Women with primary education in Northern Region have higher fertility than uneducated women. This may be because primary education increases the ability to have live births through improved health, better nutrition, lower infertility and shortening of the duration of breastfeeding and postpartum abstinence, without lowering fertility desires or increasing the use of modern contraception to compensate for these changes (Cohen 1993; Muhuri, Blanc and Rutstein 1994; Jejeebhoy 1995; Agadjanian and Prata 2001). Indeed, as will be discussed in Chapters 6 and 7, the durations of breastfeeding and abstinence are shorter, and infertility is less prevalent, for women with primary education than for those who have no education. In Central Region women with no education and those with primary education have the same TFR, whereas for the country as a whole and for Southern Region women with primary school have slightly lower fertility than those with no education but the difference is small (6 and 9%, respectively). Sathar (1996) found that in Pakistan, small differences in fertility between women with primary education and those with no education were more related to differences in patterns of marriage than to a better ability to control fertility by women with primary schooling. Also, in a gender-stratified society, such as Mozambique, primary education may do little to enhance women's social and economic self-reliance or to reduce women's reliance on children for social acceptance and economic security (see Cleland and Jejeebhoy 1996 on Asia).

Table 4.5 also shows that more educated women experienced a greater fertility decline between the 1980 and the 1997 censuses. The TFR of women with secondary or higher education declined by 36 per cent between 1980 and 1997, compared with 13 per cent for women with primary education and 11 per cent for uneducated women. Interestingly, the 1997 regional pattern of fertility is not consistent at all levels of education: for uneducated women the highest fertility is found in Central Region, but at higher levels of education, the highest fertility is found in Northern Region. This may reflect the fact that the highest prevalence of infertility, which is an important fertility-inhibiting factor, especially for uneducated women, is found in Northern Region (see Chapter 7).

4.3.2 Employment status and fertility

Women's labour force participation is another factor influencing fertility behaviour. Its effect on fertility is not unidirectional and appears to be related to the level of development (Kasarda, Billy and West 1986). In developed countries women's employment has a negative effect on fertility, whereas in developing countries positive, null and negative effects have been reported (Kasarda et al. 1986; Mboup and Saha 1998; Brewster and Rindfuss 2000). These apparent inconsistencies in developing countries are commonly attributed to differences in the definition of employment, especially the distinction between informal and formal employment (Kasarda et al. 1986; Shapiro and Tambashe 1997). Only women's employment outside the home (modern sector) bears a negative relationship with fertility performance (Singh and Casterline 1985; Kasarda et al. 1986; Bernhardt 1993; Mahmud and Johnston 1994; Shapiro and Tambashe 1997). Since wage employment requires long-term institutionalised training, women working in the modern sector of the economy tend to marry late and consequently attain lower fertility than non-working women or those working in the informal sector (Kinfu Ashagrea 2001:173).

Another explanation for the inverse relationship between women's work outside the home and fertility is based on the incompatibility between women's productive and reproductive roles (Kasarda et al. 1986; Mahmud and Johnston 1994).

> The only way the working mother can alleviate [this] role conflict is to reduce her competing obligations to manageable proportions. Since occupational demands remain fairly rigid while family size can be modified, women tend to opt for smaller families (Kasarda et al. 1986:118).

Because of this conflict between mother's and productive roles, the opportunity cost of having children for women working for wages is very high (Oppong 1983; Kasarda et al. 1986; Kalwij 2000). Further, wage employment provides women with an independent source of income, freedom of movement, less dependence on others and high levels of interaction with other women (Dharmalingam and Morgan 1996:187). These interactions in the workplace are conducive to exchange and adoption of reproductive information including about contraception (Agadjanian 2000:18).

Table 4.6 shows that women who are employed in the modern sector have on average three children less than women working in the informal sector, familial workers or those not working at all. The TFR of self-employed women (working in informal sector) is not different from that of familial workers, and is one child higher than that of non-working women. This suggests that working in the informal sector does not conflict with childbearing. The majority of self-employed women are engaged in agriculture, 98 per cent in rural areas and 65 per cent in urban areas. In urban areas, a significant proportion of women (30%) is engaged in informal trading. This kind of activity does not require long absences of women from home and is compatible with women's childbearing and childrearing roles. The lower fertility observed for non-working women compared with those working with no wage or in the informal sector may reflect the fact that a higher proportion of women who are not working are never-married (47%) or still at school (28%) and hence less likely to attain high fertility.

Table: 4.6 Total fertility rate by employment status, women aged 15-49, Mozambique 1997

Employment Status	TFR
Not working	5.2
Unpaid worker/family workers	6.0
Self-employed/informal sector	6.3
Modern sector/formal sector	3.0

Source: Author's RGM estimates from 1997 Census.

4.3.3 Rural-urban differentials

Research on fertility differentials has consistently observed that women living in urban areas have lower fertility than rural women (Mosk 1980; Okore 1980; Chimere-Dan 1990; Zaki and Johnson 1993; Khan and Raeside 1994; Muhuri et al. 1994; Buckley 1998; Mboup and Saha 1998; Shapiro and Tambashe 2001). This difference in fertility may reflect different socio-economic status between urban and rural women. Women in urban areas are better educated, more likely to participate in the formal labour market, marry later, and have better knowledge of, and access to, modern contraception than women in rural areas (Cohen 1993; Shapiro and Tambashe 2001). On the other hand, because the costs associated with childbearing are higher in urban than in rural areas, where children help with domestic and agricultural activities, women in urban areas are more likely to appreciate the advantages of having a small family (Cohen 1993; Jolly and Gribble 1993). Higher fertility in rural than urban areas may also be partly due to rural residence itself, since rural life is associated with many norms and beliefs that tend to favour large families (United Nations 1987:188).

As expected, the estimated total fertility rates (Table 4.7) are lower in urban than in rural areas. At the national level, the difference is 1.7 children per woman, reflecting a rural total fertility rate of 6.3 compared with 4.6 for urban areas. Rural-urban differences are larger in Central (1.9) than in either Northern (1.2) or Southern (1.4) Regions. In relative terms, urban fertility is 28, 18 and 25 per cent lower than rural fertility in Central, Northern and Southern Regions, respectively. In seven of the ten provinces the rural-urban difference in TFR exceeds one child per woman, approaching two in Sofala. There is almost no difference between rural and urban TFR in Manica, where the urban TFR is only 0.2 children less than the rural. Indeed, Chimoio (in Manica) is the provincial capital with the highest TFR (6.2), 2.1 children per woman higher than the national average. Using quantitative and qualitative approaches, Martinho (2000) suggests that the reasons behind high fertility in Chimoio City may lie in the high social prestige enjoyed by women with many children and the absence of motivation for the adoption of modern contraception. Furthermore, Manica, as well as Niassa, Nampula and Tete, all of which have provincial capitals with TFRs of 5.0 or higher, are among the least developed provinces in the country (Ministério do Plano e Finanças 2000).

Table 4.7 also shows that the TFR is always lower in the provincial capitals than in other urban areas, which is consistent with findings elsewhere in sub-Saharan Africa (Shapiro and Tambashe 2001). At the national level women in the provincial capitals, including Maputo City, have on average 1.7 children less than women in other urban areas. The difference is highest in the Central Region (1.8), especially in Zambézia (2.0) and Sofala (1.8) provinces, intermediate in Northern, and lowest in Southern Region. There is little or no difference between the provincial capital TFR and the other urban TFR in Inhambane, Niassa and Manica. In Inhambane this may be because the majority of women living outside the capital (Inhambane City) reside in Maxixe, a city similar to Inhambane in socio-economic development. This may also apply in Niassa and Manica where the capital cities, Lichinga and Chimoio, are no more developed than the other urban centres.

Table 4.7 Total fertility rate by place of residence and province, Mozambique 1997

Region/Province	Rural	Urban			Rural-urban difference		Other urban-Capital difference	
		Total	Capital	Other	Absolute	Per cent of rural	Absolute	Per cent of other
Northern	**6.6**	**5.4**	**5.0**	**5.7**	**1.2**	**17.8**	**0.7**	**12.5**
Niassa	6.9	6.0	5.9	6.1	0.9	13.3	0.1	2.4
Cabo Delgado	6.0	4.7	4.2	4.7	1.4	22.9	0.6	12.5
Nampula	7.0	5.9	5.0	6.1	1.2	16.4	1.1	17.9
Central	**7.0**	**5.1**	**4.5**	**6.3**	**1.9**	**27.6**	**1.8**	**28.7**
Zambézia	6.9	5.5	4.0	6.0	1.4	20.4	2.0	33.4
Tete	7.4	5.9	5.0	5.9	1.5	20.6	0.9	15.7
Manica	6.5	6.3	6.2	6.5	0.2	2.3	0.3	4.1
Sofala	6.6	4.8	4.0	5.8	1.8	26.8	1.8	30.7
Southern	**5.5**	**4.1**	**4.0**	**4.6**	**1.4**	**25.4**	**0.5**	**11.4**
Inhambane	5.6	4.2	4.1	4.2	1.4	25.1	0.0	0.8
Gaza	5.6	4.9	4.5	5.1	0.7	12.8	0.6	12.4
Maputo Province	5.3	4.0	3.9	4.5	1.4	25.9	0.6	14.3
Maputo City		3.9						
Mozambique	**6.3**	**4.6**	**4.1**	**5.8**	**1.7**	**27.1**	**1.7**	**28.7**

Source: Author's RGM estimates from 1997 census.

Age-specific fertility rates are shown in Table 4.8 for rural and urban areas in 1980 and 1997. The estimates show that rural-urban differences in fertility have widened, reflecting a much faster fertility decline in urban areas than in rural areas. Urban fertility declined by 2.0 children per woman (30%) between 1980 and 1997, against 0.9 children per woman (13%) decline observed in rural areas. In rural areas most of the decline occurred among women aged 25-44, while for the urban areas the decline was at all ages suggesting that it may have been related to both delayed marriage and fertility control within marriage. According to Shapiro and Tambashe (2001:9) the differential decline of fertility by place of residence suggests a three-stage transitional pattern. In the initial stage rural fertility is more or less stable while urban fertility declines. The second stage is characterised by declines in both urban and rural fertility, with the decline in urban larger than in rural fertility. And finally, in the third stage, when low fertility has been achieved, the pace of decline is greater in rural than in urban areas. The figures presented earlier appear to be consistent with the second stage of this transitional pattern. Unfortunately, the lack of regional data for 1980 prevented the analysis of intercensal declines by place of residence for each region.

Table 4.8 Age-specific fertility rates by place of residence, Mozambique 1980 and 1997

Age-group	1980			1997			1980-1997 (%)[b]	
	Rural	Urban	% difference[a]	Rural	Urban	% difference[a]	Rural	Urban
15-19	0.169	0.167	0.9	0.161	0.120	25.7	4.3	28.3
20-24	0.301	0.299	0.6	0.277	0.211	23.8	7.9	29.5
25-29	0.310	0.297	4.1	0.276	0.207	25.2	10.8	30.4
30-34	0.279	0.252	9.7	0.240	0.174	27.4	13.8	30.7
35-39	0.227	0.190	16.2	0.189	0.132	30.4	16.7	30.8
40-44	0.125	0.095	24.0	0.100	0.065	34.4	20.1	31.0
45-49	0.031	0.019	38.8	0.029	0.014	53.1	7.0	28.8
TFR	7.2	6.6	8.4	6.3	4.6	27.1	12.0	30.1

Notes: a Per cent of rural; b per cent difference of 1980 estimates.
Source: Author's RGM estimates from 1980 and 1997 Censuses.

4.3.4 Socio-cultural characteristics and fertility

Socio-cultural characteristics are important factors influencing fertility behaviour. Differences in fertility according to women's religion and ethnicity have been observed in many societies (Goldscheider and Uhlenberg 1969; Goldscheider 1971; Devis 1973; Chamie 1981; Bailey 1986; Adegbola 1988; Kollehlon 1989; Mosher, Williams and Johnson 1992; Johnson 1993; Khlat, Deeb and Courbage 1997; Addai and Trovato 1999; Knodel et al. 1999; Avong 2001). Theoretically, these differences have been interpreted in terms of four hypotheses: the 'characteristic hypothesis', the 'norms hypothesis', the 'interaction hypothesis', and the 'minority group hypothesis' (Knodel et al. 1999). According to the 'characteristics hypothesis', the observed fertility differences among women of different religious and ethnic groups are largely due to differing demographic and socio-economic characteristics of individuals belonging to different groups. Thus, irrespective of their religious and ethnic backgrounds, women who possess the same socio-economic characteristics are expected to have identical fertility levels.

In contrast, the 'norms hypothesis' incorporates church doctrine and cultural norms and practice in explaining fertility differentials. This hypothesis views religious differences in fertility as a reflection of specific theological tenets or doctrines about contraception, abortion and family size (Johnson 1993; Knodel et al. 1999). Likewise, ethnic differences in the durations of breastfeeding and postpartum abstinence, prevalence of polygyny, widowhood and infertility may operate to perpetuate differences in fertility between members of different ethnic groups (Addai and Trovato 1999:411).

The proponents of the 'interaction hypothesis' posit that the relationship between religion or ethnicity and fertility is not static (Chamie 1981). It changes over time in response to socio-economic change, as expected by the demographic transition theory (Knodel et al. 1999). Thus, in traditional (pre-transitional) societies, irrespective of their religious or ethnic affiliation, women have high fertility. As the society modernises and social changes occur, the role of religion and ethnicity becomes inconsequential and all subgroups end up having low fertility (Adegbola 1988). This hypothesis has been criticised for ignoring potentially important interactions between religion, social change, and demographic outcome (Knodel et al. 1999). According to Knodel et al. (1999:150), the hypothesis assumes that all religious (and ethnic) groups eventually respond in a similar manner to the socio-economic change associated with fertility transition, and it does not allow for differences in the nature of the relationship between socio-economic characteristics and reproductive behaviour and attitudes among groups.

Finally, the 'minority group hypothesis' (Goldscheider and Uhlenberg 1969) attributes a causal role to the social position held by different religious and ethnic groups in a society. According to this hypothesis, in the absence of a pronatalist ideology, the insecurities and marginality associated with a desire for upward social mobility may depress minority group fertility below that of the majority group.

Table 4.9 shows that religious differentials in fertility are not substantial in Mozambique. However, two religious categories stand out: the Zionists with the lowest fertility (5.4) and women with no religion with the highest (6.3). Women in the remaining categories have similar fertility, with a TFR between 5.8 and 6.0 births per woman. The fertility of the Zionists is 0.7 children or 11 per cent less than the national average and 0.9 children or 14 per cent less than the fertility of women with no religious affiliation. The relatively low fertility of the Zionist women may be a reflection of their high socio-economic status as measured by education, urban residence and labour force participation. According to the 1997 census the Zionists have the highest literacy rate (38%), compared with the Catholics (33%) and Protestants (33%), and most of them (61%) live in Southern Region where fertility is low (see Section 4.2.1). In contrast, women with no religion, along with Muslims, are the least educated (literacy rate 15% for Muslims and 17% for no-religion women) and live in Central Region (62%) where fertility is the highest in the country. On the other hand, women with no religion may have fewer opportunities to interact with other women and hence are less likely to acquire reproductive innovations leading to low fertility, than women with religious affiliation (Agadjanian 2000, 2001a, b). Women's religion-based interactions may be important in influencing reproductive preferences and behaviour since women spend much of their time in various religion-related activities (Agadjanian 2001b). These interactions facilitate the spread of contraceptive innovations between members who are heterogeneous with respect to contraceptive use because of differing socio-economic and cultural background (Agadjanian 2001b:136).

Table: 4.9 Total fertility rate by religious and ethnic affiliations, Mozambique 1997

Religious affiliation		Ethnic affiliation	
Religion	TFR	Ethnicity	TFR
Catholic	5.8	Tsonga	4.9
Protestant	6.0	Sena/Ndau	6.3
Muslim	5.8	Lomwe/Chuwabo	6.3
Zionist	5.4	Macua	6.6
Other religion	5.9	Other local	5.9
No religion	6.3	Portuguese/foreigner	3.6

Source: Computed from 1997 Census, using RGM.

Regarding ethnic affiliation, the differences are much more substantial than in the case of religion. The 'Portuguese/Foreigner' category has a lower TFR than the other categories, reflecting its composition which includes an elite group of women whose first language was Portuguese, and women of European/Asian origin or descendants of Europeans and Asians. Among the local ethnic groups, the difference between the lowest (Tsonga) and the highest (Macua) TFR is 1.7 children per woman. As in the case of religion, socio-economic status of the members of the different ethnic groups may explain part of the observed differences. The Tsonga, living in the more prosperous Southern Region, are the most educated group (female literacy rate of 51%), and also have the highest age at marriage and the highest contraceptive prevalence rate (see Chapters 5 and 8). On the other hand, the Macua, who live in the remote Northern Region, are the least educated group with only 11 per cent of women aged 15 to 49 being able to read and write. Macua women exhibit the earliest age at marriage in the country, with SMAM less than 16 years. The extent to which the hypotheses presented earlier explain the observed religious and ethnic differences in fertility will be discussed in more detail in Section 4.4 where the multivariate analysis is presented.

4.3.5 Marital status and fertility

In many societies marriage usually marks the beginning of family formation and represents the institution within which childbearing should occur. However, in reality, and especially in sub-Saharan Africa where the incidence of premarital childbearing is high (Gage and Meekers 1994; Meekers 1994a), a significant proportion of births occur outside marriage. This subsection discusses the extent to which non-marital childbearing is prevalent in Mozambique. In 1997 30 per cent of women aged 15 to 49 were unmarried. The corresponding percentages by region are 23 per cent in Northern, 29 in Central and 42 per cent in Southern Region.

Presented in Table 4.10 are the total fertility rates by marital status at the 1997 census (there is no information for the 1980 Census) and the proportion of births to unmarried women in the previous year. Marital fertility is twice as high as the fertility of unmarried women, and 13 per cent higher than overall fertility. The table shows that the non-marital TFR in Mozambique in 1997 was 3.3 births per woman. This figure is twice as high as the figure for South Africa in 1996 (1.7 births per woman), considered by Sibanda and Zuberi (1999:94) as the country with the highest level of non-marital fertility in sub-Saharan Africa. Although the fertility of unmarried women is higher in Mozambique than in South Africa, because total fertility is high, the contribution of unmarried women to the total fertility is far less than in Botswana, Namibia and South Africa. Only 13 per cent of the births occurring during the 12-month period before the 1997 Census in Mozambique were to unmarried women. In contrast, 51 per cent of the total births recorded in Botswana and 37 per cent in Namibia, in the early to mid-1990s had occurred to never-married women (Gage 1998:25; Kinfu Ashagrea 2001:183). In South Africa in the period 1989-90 about 70 per cent of all recorded births to African women were classified as 'illegitimate' (Sibanda and Zuberi 1999:95). However, this figure was considered inflated because many customary-law African marriages were not recognised by the apartheid state (Sibanda and Zuberi 1999:95).

Ethnographic research in South Africa suggests that the high incidence of births outside marriage in that country is related to high societal tolerance of the phenomenon (Preston-Whyte and Allen 1992; Preston-Whyte and Zondi 1992; Rubinsztein 1992). There is no condemnation of early sexual activity or pregnancy among girls and their families, and once premarital pregnancy has occurred, the parents accept the situation and take the child into their home (Preston-Whyte and Allen 1992:214). In Botswana, the increase in age at marriage is mainly due to the inability of men of marriageable age to sustain independent households and to meet the expenses of marriage, and the relaxation of moral and cultural constraints on women bearing children without marrying is related to a high level of non-marital births (Pitso 1997:254-266). In Lesotho, where the cultural stigma against extramarital, especially premarital, sexual relationships is still fairly strong so that the girl who becomes pregnant before marriage experiences social ostracism, only a small proportion, 3 per cent in 1995, of births occur out of wedlock (Mturi and Moerane 2001).

In Mozambique, the degree to which society tolerates extramarital (premarital in particular) childbearing may be related to social organisation, that is, whether the society is matrilineal or patrilineal. Premarital births may be more tolerated in matrilineal than in patrilineal societies (Gluckman 1950). In matrilineal societies if a woman gives birth before marriage, the child will enjoy membership in the mother's lineage, just like children born within marriage. In patrilineal societies, children generally belong to the lineage of the man who paid bridewealth, and marriage is a more important and the most recognised institution for childbearing (Meekers 1992:71).

Table 4.10 shows that ethnicity, region and place of residence play a role in the levels and differentials of non-marital fertility in Mozambique. Ethnicity contributes to regional variation in non-marital fertility. Non-marital fertility is higher among the matrilineal Macua and Lomwe/Chuwabo ethnic groups (mostly in Northern Region) than among the patrilineal Tsonga and Sena/Ndau, found mainly in Southern and Central Regions respectively. However, the contribution of never married women is higher among urban and Tsonga women than among rural women and those belonging to the other ethnic groups, especially if matrilineal. It appears that for the matrilineal ethnic groups (especially Macua) extramarital fertility is related to marital disruption, while for the Tsonga and urban women the fertility of never married women is the most important. It will be seen in Chapter 5 that Macua marriage is early and very unstable whereas the Tsonga have more stable unions and marry late. Although not encouraging premarital sexual relations, the Tsonga tolerate them. According to Junod (1974:188) only sexual intercourse with a married woman was considered adulterous and condemned. Sexual intercourse of a man, single or married, with an unmarried girl was not condemned because in the case of pregnancy all the man had to do was to marry the girl. The higher contribution of pre-marital fertility among the Tsonga may be related to late and increasing age at marriage. In a study of premarital childbearing in sub-Saharan Africa, Meekers (1994a:61) found that although first sexual intercourse tends to occur at a later age than in the past, it is increasingly occurring before marriage. Since contraceptive use remains low among adolescents this leads to an increase in premarital childbearing.

Table 4.10 Marital and non-marital fertility, and the percentage of births outside marriage by selected socio-economic characteristics, Mozambique 1997

	Total Fertility Rate		% of births in the last 12 months to:		
	Non-marital	Marital	Widowed/divorced	Never married	All unmarried
Region					
Northern	4.5	7.0	8	6	13
Central	3.0	7.3	6	3	9
Southern	2.7	6.1	6	15	21
Place of residence					
Urban	2.5	6.0	6	11	17
Rural	3.8	7.2	7	5	12
Ethnicity					
Tsonga	2.9	6.2	6	14	20
Sena/Ndau	2.8	7.4	5	3	8
Lomwe/Chuwabo	3.2	7.3	7	3	10
Macua	4.7	7.1	8	5	13
Other	3.4	6.8	7	5	12
Portuguese	1.8	5.2	5	18	23
Mozambique	3.3	6.9	7	7	13

Source: Computed from 1997 Census, using RGM.

Women of the Portuguese/foreigner ethnic background have the lowest rates of both marital and non-marital fertility, but they have the highest contribution of non-married women to total fertility. This may reflect, perhaps, late marriage and low social stigma associated with non-marital childbearing among this group. However, the diversity of this group makes it difficult to explain its behaviour.

4.4 The determinants of lifetime and current fertility: a multivariate analysis

The bivariate analysis performed in the preceding sections has shown that living in the Southern Region, having secondary education, working in the modern sector, living in an urban area, especially the national or provincial capital, and being of Tsonga ethnic background were associated with low fertility. However, because in a bivariate analysis the effect of the confounding factors cannot be controlled for, the observed relationship reflects the combined influence of many factors, rather than solely the one under investigation. This section applies multivariate analysis to explore the net effect of each socio-economic characteristic on lifetime and current fertility.

The statistical procedure for the analysis of lifetime fertility is the Poisson regression model. It is the most suitable procedure for the study of a descrete dependent variable, such as children ever born (CEB), and has increasingly been used for the analysis of fertility (Rodríguez and Cleland 1988; Rodríguez and Aravena 1991; Nguyen-Dinh 1997; Wang and Famoye 1997; Al-Qudsi 1998; Kinfu Ashagrea 2001). Unlike the more widely used Ordinary Least Squares regression (OLS), the Poisson model does not assume a constant error variance nor a normal distribution of the dependent variable, an assumption that is rarely met in lifetime fertility data (Raftery et al. 1996:132). However, the Poisson regression procedure assumes that the mean and variance of the dependent variable are equal (Winkelmann and Zimmermann 1991:140; Winkelmann and Zimmermann 1995:2; Wang and Famoye 1997:274). In reality, such assumption (also known as equi-dispersion assumption) is rarely met and the variance can be either larger (over-dispersion) or smaller (under-dispersion) than the mean. When the variance is not equal to the mean, especially in the case of over-dispersion, which is more common in the demographic applications of the model, the Poisson regression parameters are still consistent but inefficient owing to underestimation of the standard errors and overestimation of the chi-square statistics (Winkelmann and Zimmermann 1995:2; Kinfu Ashagrea 2001:185). In such a situation, the negative binomial regression model is frequently used instead of the standard Poisson model (Nguyen-Dinh 1997:257; Wang and Famoye 1997:274). See the equation of the Poisson model in Appendix A.

Because the results are conditioned to the appropriateness of the model used, certain procedures have to be followed to select the most suitable model for a given data condition. A common procedure is to conduct a Wald test on α, the parameter that measures the degree of dispersion in the data (Winkelmann and Zimmermann 1991). When the dispersion parameter is zero the equi-dispersion assumption is met (mean equal to the variance) and the standard Poisson regression is the appropriate model. On the other hand, if the dispersion parameter is negative (under-dispersion) or positive (over-dispersion) the equi-dispersion assumption is violated and the suitable models are generalised Poisson and negative binomial regression models, respectively (Wang and Famoye 1997; Kinfu Ashagrea 2001:186). This criterion was used for the selection of the models suitable for use in the present study.

For the analysis of current fertility the dependent variable is a dichotomous variable indicating whether or not a woman had a birth in the year before the 1997 census or DHS. Because of the nature of the dependent variable the statistical procedure applied is the logistic regression (see details including the logistic regression equation in Appendix A).

The independent variables included in the analysis are those used in the bivariate analysis plus age and child loss experience (expressed as the proportion of CEB who have died) for the analysis of lifetime fertility (mean CEB), and current contraceptive use and marital status for the analysis of current fertility. Because a linear relationship between age and CEB cannot be assumed for the present data, age-squared was also included in the model as an additional variable. For the independent variables that are categorical, dummy variables were constructed.

The regression models were fitted to both the 1997 census and DHS data. For the 1997 census data, the models were fitted to a 0.5 per cent random sample, of about 14,000 women, drawn from the data set of women aged 15-49. The models were estimated separately for younger (15-29) and older (30-49) women in order to see whether the effect of socio-economic variables on fertility varies with age.

Regarding the statistical procedure for lifetime fertility, the Wald test conducted on the DHS data and on the younger group of women from the census data yielded a dispersion parameter that is indistinguishable from zero, meaning that the standard Poisson regression model is appropriate. For the census data for all women and for the older age group the models exhibited some evidence of over-dispersion and the negative binomial regression model was fitted.

Table 4.11 Poisson and negative binomial regression coefficients for the effect of women's socio-economic characteristics on lifetime fertility by age, Mozambique 1997 Census

Socio-economic characteristics	Standardised Beta (β) coefficients		
	All ages	15-29	30-49
Education			
No education ®	0.000	0.000	0.000
Primary	-0.007	-0.025	0.010
Secondary or higher	-0.266 ***	-0.294 ***	-0.240 ***
Employment status			
Not working ®	0.000	0.000	0.000
Unpaid worker	0.566 **	0.054	0.061 *
Self-employed/informal sector	0.046 *	0.062 *	0.038
Paid worker/formal sector	-0.101 **	-0.054	-0.129 **
Religion			
Catholic ®	0.000	0.000	0.000
Protestant	-0.001	-0.015	0.006
Muslim	-0.003	0.020	-0.016
Zionist	-0.008	0.027	-0.027
Other religion	0.037	0.044	0.030
No religion	0.021	0.055	-0.005
Household owns radio			
Yes ®	0.000	0.000	0.000
No	-0.019	-0.034	-0.014
Place of residence			
Urban ®	0.000	0.000	0.000
Rural	0.004	0.011	-0.004
Age	0.182 ***	0.175 ***	0.119 ***
Age-squared	-0.002 ***	-0.002 **	-0.001 ***
Proportion children dead	0.321 ***	0.240 ***	0.389 ***
Ethnicity			
Tsonga ®	0.000	0.000	0.000
Sena/Ndau	0.008	-0.034	0.036
Lomwe/Chuwabo	0.047	-0.003	0.081
Macua	0.037	0.026	0.047
Other local	-0.003	0.025	-0.002
Portuguese & foreigner	-0.145 **	-0.122	-0.148 *
Province			
Niassa	0.150 *	0.323 **	0.082
Cabo Delgado	0.035	0.252 *	-0.054
Nampula	0.039	0.239 *	-0.040
Zambézia	0.067	0.248 **	-0.005
Tete	0.129 *	0.227 *	0.090
Manica	0.094	0.304 ***	0.007
Sofala	0.024	0.238 *	-0.063
Inhambane	-0.043	0.131	-0.100 *
Gaza	-0.046	-0.040	-0.043

Table 4.11 Continued ...

Socio-economic characteristics	Standardised Beta (β) coefficients		
	All ages	15-29	30-49
Province (continued)			
Maputo Province	0.082 *	0.116	0.070
Maputo City ®	0.000	0.000	0.000
Constant	-2.4 ***	-2.5 ***	-1.103 ***
Dispersion parameter (α)	0.033 ***	0.000 a	0.060 ***
Chi-squared	5825.0 ***	1540.8 ***	777.1 ***
No. of cases	10462	5197	5265

Notes: ® Reference category; *p≤0.05; **p≤0.01; ***p≤0.001; a Poisson model used.
Source: Computed from 1997 Census.

The results of the multivariate analysis are presented in Table 4.11 and Table 4.12 (for lifetime fertility by age from census and DHS, respectively), Table 4.13 (current fertility by age from census) and in Appendix Table D4.2 (lifetime fertility by place of residence, census), Appendix Table D4.3 (current fertility by age, DHS) and Appendix Table D4.4 (current fertility by place of residence, census). β coefficients in Tables 4.11 and 4.12 as well as in Appendix Table D4.2, where dummy variables were used, represent the effect of each category of each independent variable compared with the effect of the reference category. The regression coefficient for a woman in the reference category is equal to zero and a value of zero in any other category means that the effect of that category on fertility is the same as in the reference category. A positive value indicates higher fertility than the reference category, and a negative value lower fertility than the reference group. Similarly, the odds ratios presented in Table 4.13 and Appendix Tables D4.3 and D4.4 represent the likelihood that a woman in each category had a live birth in the year preceding the enumeration compared with a woman in the reference category. The odds ratio for the reference category is equal to unity (1.0).

Consistent with the bivariate analysis, primary education is either related to high fertility or does not have any effect on fertility, while secondary education is related to low fertility. The regression coefficients in Tables 4.11 and 4.12 indicate that there are no significant differences in lifetime fertility between women with primary education and those with no education, while Table 4.13 shows that women with primary education are 13 per cent more likely than uneducated women to have given birth in the year before the census. In contrast, women with secondary education have a fertility 23 per cent (100*(exp(-0.266)-1)) lower than uneducated women (see Table 4.11). As noted earlier, a pattern in which fertility is higher among women with primary education than those with no education has been reported elsewhere in sub-Saharan Africa and Asia (Jejeebhoy 1995; Cleland and Jejeebhoy 1996; Agadjanian and Prata 2001), and indicates the early stage of fertility transition when only secondary education depresses fertility. Small amounts of education may break down the traditional forms of birth control, as well as reducing the duration of lactation and postpartum abstinence, without leading women to adopt modern contraceptive methods, resulting in an increase in fertility. The positive effect of primary schooling on fertility is only significant for current fertility and among the older age group (see Table 4.13).

Regarding employment status, the regression coefficients presented in Tables 4.11 and 4.12 as well as the odds ratios in Table 4.13 indicate significantly higher fertility for unpaid workers and self-employed women than wage-earner women, but the overall effect of women's work on fertility is small. These findings are consistent with studies elsewhere (United Nations 1987; Shapiro and Tambashe 1997) and reflect the fact that unpaid work and work in the informal sector enable women to combine work and childcare. Furthermore, children of women working in the informal sector may have more value as producers of goods and contribute to household income, in contrast to children of formal sector employees (Shapiro and Tambashe 1997). The results also show, unsurprisingly, that women in paid work exhibit lower fertility than non-working women. However, since current employment status may not be the same as employment status at the time of childbearing, its statistical effect on lifetime fertility may be of questionable relevance. The use of current fertility as a dependent variable may also be misleading. According to Singh and Casterline (1985:215), current participation in the labour force, particularly outside the home, tends to be low for women with a very recent birth, and women who are not currently working tend to under-report past work, giving a falsely exaggerated impression of the effect of work on fertility.

Table 4.12 Poisson regression coefficients for the effect of women's socio-economic characteristics on lifetime fertility by age, Mozambique 1997 DHS

Socio-economic characteristics	Standardized Beta (β) coefficients		
	All ages	15-29	30-49
Education			
No education ®	0.000	0.000	0.000
Primary	0.007	0.018	0.003
Secondary or higher	-0.152 **	-0.034	-0.191 **
Employment status			
Not working ®	0.000	0.000	0.000
Unpaid worker	0.081 ***	0.043	0.100 ***
Self-employed	0.022	0.024	0.023
Paid worker	-0.075 *	-0.084	-0.073
Religion			
Catholic ®	0.000	0.000	0.000
Protestant	-0.015	-0.015	-0.019
Muslim	-0.068 **	0.024	-0.112 ***
Zionist	0.000	-0.039	0.004
Other religion	-0.006	0.015	-0.016
No religion	-0.043 *	-0.031	-0.053 *
Household owns radio			
Yes®	0.000	0.000	0.000
No	0.022	0.038	0.019
Place of residence			
Urban ®	0.000	0.000	0.000
Rural	-0.039	-0.039	-0.036
Age	0.199 ***	0.276 ***	0.169 ***
Age-squared	-0.002 ***	-0.004 ***	-0.002 ***
Age at first marriage	-0.030 ***	-0.057 ***	-0.024 ***
Proportion children dead	0.139 ***	0.119 **	0.146 ***
Ethnicity			
Tsonga ®	0.000	0.000	0.000
Sena/Ndau	0.062	0.026	0.085
Lomwe/Chuwabo	0.142 *	0.029	0.199 **
Macua	0.041	0.011	0.070
Other local	0.061	0.050	0.081
Portuguese & foreigner	-0.055	0.051	-0.101
Province			
Niassa	0.040	0.025	0.030
Cabo Delgado	-0.156 *	-0.072	-0.238 **
Nampula	-0.009	-0.003	-0.038
Zambézia	-0.114	-0.032	-0.166 *
Tete	0.136 *	0.131	0.129
Manica	0.030	0.053	0.002
Sofala	0.040	0.073	0.015
Inhambane	-0.066	0.045	-0.102 *
Gaza	-0.010	-0.022	-0.012

Table 4.12 Continued …

Socio-economic characteristics	Standardised Beta (β) coefficients		
	All ages	15-29	30-49
Province (continued)			
Maputo Province	0.027	0.027	0.028
Maputo City ®	0.000	0.000	0.000
Constant	-2.2 ***	-2.8 ***	-1.702 ***
Dispersion parameter (α)	0.000 [a]	0.000 [a]	0.000 [a]
Chi-square	5259.0 ***	939.5 ***	854.4 ***
No. of cases	6002	2870	3132

Notes: ® Reference category; *p≤0.05; **p≤0.01; ***p≤0.001; a Poisson model.
Source: Computed from 1997 DHS.

With regard to religion, the results show that religious affiliation has little effect on fertility. After controlling for women's socio-economic characteristics in both lifetime and current fertility models the regression coefficients and odds ratios do not differ significantly between the reference category and the other religious categories. However, Table 4.12, perhaps reflecting the effect of infertility (see Chapter 7), shows that Muslims and women with no religion have lower fertility than Catholics. Overall, the findings on religion are consistent with the 'characteristics hypothesis' presented in Section 4.3.4. According to this hypothesis religious differences in fertility are mainly an artefact of socio-economic differences among women members of different religious affiliations. Thus, they tend to vanish when controls for women's socio-economic characteristics are introduced. This hypothesis is the most commonly proved in studies that seek to explain religious fertility differentials (Johnson 1993; Agadjanian 2001b). This suggests that the relatively high fertility exhibited in the bivariate analysis by women with no religion is explainable, at least in part, by their relatively low socio-economic status. Likewise, the relatively high socio-economic status enjoyed by women who profess the *Zione* church explains their relatively low fertility.

The 'characteristics hypothesis' also appears to explain most of the ethnic differentials in fertility. As can be seen from Table 4.11, only women in the Portuguese/foreigner category have significantly lower fertility than the Tsonga, the reference category. Women of the remaining categories exhibit higher fertility than the Tsonga when socio-economic characteristics are held constant, but none of the coefficients is statistically significant at the 5 per cent level. When age at marriage is controlled for, using the DHS data set (Table 4.12) the difference between Portuguese/foreigner and the Tsonga ethnic groups disappears, indicating that marriage patterns may be the mechanism through which fertility differentials between the two can be explained. However, after age at marriage has been controlled for, the coefficient for the Lomwe/Chuwabo ethnic group becomes statistically significant, indicating higher lifetime fertility than that of the Tsonga. This may reflect the fact that Lomwe/Chuwabo women exhibit the shortest duration of postpartum sexual abstinence (see Chapters 6).

Women living in urban areas appear to have higher lifetime fertility than women in rural areas, but the coefficients are not statistically significant at the 5 per cent level. Such findings are not totally unexpected in sub-Saharan Africa (Romaniuk 1980; Chimere-Dan 1990), and reflect the early stage of the fertility transition when improvements in living conditions, particularly in health conditions, reduce infertility and increase the chances of conception. The greater exposure of urban women to modern influences contributes to increased fertility through the breakdown of family-kinship dominance, and erodes the traditional fertility–inhibitng practices of prolonged breastfeeding and postpartum sexual abstinence. However, the magnitude, and perhaps the sign, of the regression coefficients in Tables 4.11 and 4.12 may be affected by rural-urban differences in the reporting of children ever born. As discussed in Chapter 2, women in rural areas were more likely to under-report their parity than their urban counterparts, and this may have contributed to the positive effect of urban residence on fertility in this study.

In relation to current fertility, the results in Table 4.13 suggest that women in rural areas were 12 per cent more likely to have given birth in the year preceding the 1997 Census than urban women. The difference in the odds ratios of having had a birth in the year preceding the 1997 census was smaller for younger women (12%) than for the older age-group (15%) but in neither case were the odds ratios statistically significant at the 5 per cent level.

The regression coefficients presented in Tables 4.11 and 4.12, and in Appendix Tables D4.2 to D4.4, also show that there is a positive effect of women's proportion of children dead on lifetime fertility after controlling for socio-economic characteristics. The coefficients are much higher for older than for younger women and for rural than for urban women. These findings are consistent with similar analyses elsewhere in Sub-Saharan Africa and in Asia (Defo 1998, for Cameroon; Bhat 1998, for India; Kinfu Ashagrea 2001, for Addis Ababa (Ethiopia); Mturi and Hinde 1994, for Tanzania).

Table 4.13 Odds ratios of having given birth in the year preceding the census by socio-economic characteristics by age, Mozambique 1997 Census

Socio-economic characteristics	Odds ratios		
	All ages	15-29	30-49
Educations			
No education ®	1.000	1.000	1.000
Primary	1.126 *	0.969	1.325 **
Secondary or higher	0.829	0.898	0.408
Employment status			
Not working ®	1.000	1.000	1.000
Unpaid worker	1.188 *	1.326 **	0.976
Self-employed/informal sector	1.343 ***	1.464 ***	1.005
Paid worker/formal sector	0.864	0.830	0.685
Religion			
Catholic ®	1.000	1.000	1.000
Protestant	0.930	0.866	1.000
Muslim	0.922	0.983	0.781
Zionist	0.913	0.886	0.906
Other religion	1.178	1.144	1.141
No religion	1.109	0.998	1.135
Marital status			
Never married ®	1.000	1.000	1.000
Married	4.894 ***	4.373 ***	1.736 **
Divorced/widow	3.131 ***	3.660 ***	0.913
Household owns radio			
Yes ®	1.000	1.000	1.000
No	0.988	1.019	0.976
Place of residence			
Urban ®	1.000	1.000	1.000
Rural	1.124	1.120	1.145
Age	0.973 ***	1.047 ***	0.919 ***
Ethnicity			
Tsonga ®	1.000	1.000	1.000
Sena/Ndau	1.266	0.978	1.792
Lomwe/Chuwabo	1.517	1.364	1.582
Macua	1.437	1.016	2.150
Other local	1.240	0.964	1.730
Portuguese/foreigner	0.653	0.623	0.721
Province			
Niassa	1.352	1.154	1.633
Cabo Delgado	0.850	0.784	0.900
Nampula	1.007	0.885	1.255
Zambézia	0.936	0.641	1.636
Tete	1.064	0.784	1.633
Manica	1.078	1.025	1.149
Sofala	1.172	0.884	1.754

Table 4.13 Continued ...

Socio-economic characteristics	Odds ratios		
	All ages	15-29	30-49
Province (continued)			
Inhambane	1.302	0.916	2.208 *
Gaza	1.182	0.775	2.271 **
Maputo Province	1.147	0.730	2.177 *
Maputo City ®	1.000	1.000	1.000
Constant	-2.8 ***	-3.912 ***	-0.009
-2 log likelihood	12031.5	7302.3	4468.9
Chi-square	684.4 ***	621.0 ***	299.8 ***
No. of cases	14110	8425	5685

Notes: ® Reference category; *p≤0.05; **p≤0.01; ***p≤0.001.
Source: Computed from 1997 Census.

With regard to the women's province of residence, the results reported in Table 4.11 for all ages show that after controlling for women's socio-economic background significant provincial differences remain. Women living in Niassa, Tete and Maputo Province have significantly higher fertility than the women in Maputo City, the reference category, which has the lowest TFR. Provincial differences in lifetime fertility are larger for younger than for older women. For the younger women, all provinces in Northern and Central Regions have positive and statistically significant regression coefficients, while there are no differences between Maputo City and the remaining provinces in the Southern Region. However, when age at marriage was brought into the equation (Table 4.12) the differences were completely eliminated. In contrast, for the older women, the provincial differences in lifetime fertility remained after age at marriage had been taken into account. Five provinces (Maputo Province, Sofala, Manica, Tete and Niassa) have positive coefficients, while for the remaining five the coefficients are relatively high and negative indicating lower fertility than Maputo City. A plausible explanation for this pattern may lie in the prevalence of infertility. Indeed, two of the three provinces with statistically significant negative coefficients (Cabo Delgado and Inhambane) are among the provinces with the highest prevalence of infertility (see Chapter 7).

The models based on current fertility suggest a different story. As can be seen from Table 4.13, only older women in Inhambane, Gaza and Maputo Province were significantly more likely to have given birth in the year preceding the census than women in Maputo City. The model for all women and that for younger women show no provincial differences in the odds ratios of having given birth in the last 12 months before the enumeration. However, these differences are totally eliminated when current use of modern contraception is brought into the equation, using the DHS data set (see Appendix Table D4.4), but women in Nampula and Cabo Delgado became significantly less likely to have given birth in the year before the enumeration than their counterparts in Maputo City, reflecting, perhaps, as mentioned earlier, the high prevalence of infertility in these two provinces.

4.5 Conclusion

This chapter has examined the differentials in fertility and their association, at the aggregate and individual levels, with women's region/province of residence and socio-economic and cultural characteristics, using both bivariate and multivariate techniques. The results of the analysis revealed significant variation in the total fertility rate by province, educational level, employment status, child loss experience and marital status.

The aggregate analysis of regional variation in fertility revealed that in 1997 fertility was higher than the national average in Northern and Central Regions and lower in Southern Region. Only in two out of seven provinces in Northern and Central Regions was TFR slightly lower than the average, while in the Southern region all provinces recorded lower TFRs than the national average. The comparison of the two censuses shows that the provincial differences had widened between 1980 and 1997. The fertility gap increased from 2.6 births per woman in 1980 to 3.2 births per woman in 1997. The bivariate (aggregate) and multivariate analyses suggest that provincial socio-economic development and provincial differences in women's socio-economic status are the main contributing factors to variation in fertility. Indeed, when the confounding factors were controlled for, at the individual level, provincial differences in fertility vanished, except for the older age group, where the differences persisted reflecting, perhaps, differential incidence of infertility.

The findings on education showed that only secondary education was associated with lower fertility. Women with primary schooling were either not different from those with no education or more likely to have higher average lifetime fertility. This pattern of education-fertility relationship, commonly found in sub-Saharan Africa and in some countries in Asia (Cleland and Jejeebhoy 1996), is mainly attributed to the beginning of the fertility transition with primary schooling reducing infertility and shortening the duration of both breastfeeding and abstinence but failing to compensate by increasing the use of modern contraception. Also consistent with an early stage of fertility transition is the absence of a significant difference between urban and rural fertility when socio-economic factors have been controlled for.

Employment status was also found to be an important factor in shaping women's fertility possibly through incompatibility of women's reproductive and productive roles. Familial (unpaid) workers and self-employed, and non-working women were more likely to have higher lifetime fertility than women working for wages after confounding factors had been controlled for. This reflects not only the high opportunity costs of having children for wage-earning women, for whom having a child may mean interrupting their professional career, but also the greater compatibility of childbearing and childcare roles with women's unpaid or self-employment, mainly agriculture and informal trading which take place at home or nearby.

Differentials in lifetime fertility were also very significant according to child loss experience. The proportion of children dead was a powerful predictor of fertility, especially among older and rural women, after women's socio-economic and cultural characteristics had been controlled for, indicating that women may be having a large number of children to ensure that some will survive. In agreement with this finding is the fact that in the bivariate analysis of provincial variation in fertility, the under-five mortality rate yielded one of the strongest associations with total fertility rate, explaining about 64 per cent of the provincial variation in fertility.

Regarding women's ethnic and religious affiliation, the differentials observed from the bivariate analysis were completely eliminated once other socio-economic characteristics were controlled for. However, for ethnicity, the results from the census data revealed that the differences persisted for the younger women even after controls were introduced. Only when age at marriage was controlled for, using the DHS data, did the differences disappear, implying that marriage is the mechanism through which ethnicity affects fertility in Mozambique.

Non-marital fertility is high at 3.3 births per woman and about half of marital fertility. This level is high by southern African standards, mainly because total fertility is also high, where non-marital childbearing is very high and socio-cultural stigmas associated with it are being eroded (Preston-Whyte and Allen 1992; Preston-Whyte and Zondi 1992; Pitso 1997; Sibanda and Zuberi 1999). However, the contribution of unmarried women to the overall number of births is far less than in countries like South Africa, Botswana and Namibia. The results also suggest some regional variation in non-marital fertility within the country, reflecting differences in the ethnic composition of the regions. Non-marital fertility is generally higher among matrilineal than patrilineal ethnic groups, but there are some differences in the contributing factors. In the matrilineal ethnic groups, especially among the Macua, where marriage is very unstable, much of the contribution comes from widowed and divorced women, while in the patrilineal ethnic groups, in particular the Tsonga, much of non-marital fertility is due to a high prevalence of premarital childbearing.

Chapter 5

NUPTIALITY PATTERNS

5.1 Introduction

In the previous chapter marriage was shown to be one of the most important factors contributing to fertility differences between regions and provinces. This chapter examines this proximate determinant of fertility in Mozambique, focusing on age at marriage and the proportion marrying, polygyny and marital dissolution. This is important in explaining fertility differentials because marriage patterns help to determine the overall length of exposure to childbearing.

The chapter is organised as follows. Section 5.2 describes the types of marital union and the marriage process in Mozambique. Marriage practices such as bridewealth payments may affect both the timing of marriage and the likelihood of divorce or separation. Section 5.3 discusses the trends and differentials in age at marriage and the proportion marrying by applying both bivariate and multivariate techniques. The levels, trends and differentials of polygyny are discussed in Section 5.4. Section 5.5 examines the differentials in marital dissolution. Section 5.6 summarises the findings.

5.2 Types of marital union and the marriage process

5.2.1 Types of marital union

In the past, almost all marriages were arranged by the parents or older relatives, and represented a means through which the ties between two families or lineage groups could be reinforced and strengthened. Today's Mozambique also has other types of marital relationship. Below is a brief decription of the main types.

(a) Customary marriage: this is a traditional Mozambican form of marriage and is usually carried out with the consent of both families. It is a process involving a series of stages that can go on for months and even years. The way the process is conducted varies according to ethnic groups. While among the patrilineal groups the process is centred on the payment of bridewealth from the boy's family to the girl's family, among the matrilineal such payments are small or not required. Under customary marriage, polygyny is permitted without any limit on the number of wives. In fact, among patrilineal ethnic groups polygyny is recommended when the first wife is infertile. More details on the process of marriage in Mozambique are given in Section 5.2.2.

(b) Religious marriage: this is a marriage celebrated in a Christian or Muslim church with a ceremony to bless the union of the couple where one or both partners are members of that church. Christian marriages are monogamous and indissoluble, whereas polygyny up to a maximum of four wives per man and divorce are permitted under Islamic law. This type of marriage is more expensive than customary marriage, since apart from bridewealth payments (patrilineal ethnic groups), wedding rings and modern clothes are also required. The church keeps a record of the marriage and a marriage certificate is issued to the couple.

(c) Civil marriage: this is a registered union of a single/divorced/widowed woman with a single/divorced/widowed man under the civil law. It is monogamous and indissoluble except by a decree of divorce issued by a court of law. Under Mozambican civil law the minimum age of marriage is 14 years for females and 16 years for males (República de Moçambique 2001)[7]. Although this type of marriage is monogamous, in practice some men are married by civil marriage to their first wives and live with more than one woman. Because this type of marriage is expensive, it is more prevalent among urban and more educated segments of the population. It should also be noted that, except for those of European and Asian background, civil marriage usually takes place after traditional requirements have been met: for example, bridewealth has been paid, in the case of patrilineal ethnic groups. Thus, in practice, women who are civilly married are also customarily and religiously (if they are affiliated to some religion) married at the same time.

(d) Mutual consent union/Cohabitation: this is a relationship where persons of opposite sex cohabit without going through the formalities of customary, religious or civil marriage. Although a mutual consent union could be a temporary relationship lasting for few months, it may be a more permanent tie where the couple lives like husband and wife. In some cases, cohabitation represents a stage before the completion of the marriage process, that is, before the social sanctioning of the union. For example, it is a tradition

[7] The Family Law is still as inherited from the Portuguese administration, but it is currently under review and the legal age at marriage could rise to 18 years for both males and females (República de Moçambique 2001).

among the Macua that the couple lives a 'period of proof' of about one year, when they have a normal husband-and-wife life, before the marriage process is complete (see Section 5.2.2). In contrast, among the Tsonga, cohabitation usually takes place only after the bridewealth has been paid in full, except in the case of premarital pregnancy, where cohabitation may precede the completion of bridewealth payment.

Despite the existence of these types of union, the available data do not distinguish between them. Neither the 1997 census nor the 1997 DHS distinguished customary marriage from cohabitation, and religious marriage from civil marriage. Customary marriage and cohabitation were treated as a single category, labelled 'Marital union/living together', and religious and civil marriage as the 'married' category. Thus, in this analysis, women in both 'marital union/living together' and 'married' categories are considered as married. The non-distinction between the four types of marriage, especially the distinction between customary marriage and cohabitation, may affect the results, in particular the ethnic differentials. Women of ethnic groups which allow cohabitation before the completion of the marriage process (e.g. Macua) are more likely to have been recorded as being in a marital union than women of ethnic groups where cohabitation is not allowed before the completion of the marriage process (e.g. Tsonga). This would lead to an overestimation of the proportion currently married and an underestimation of average age at marriage among the former groups and an underestimation of the proportion currently married and an overestimation of average age at marriage among the latter groups.

5.2.2 The process of marriage in Mozambique

This section gives a brief description of the customary marriage process among the major ethnic groups in Mozambique: the Tsonga, Sena/Ndau, Macua and Lomwe/Chuwabo. The description is based on qualitative data collected during fieldwork in the Southern Region in 2001 (see Chapter 2) for the Tsonga, and on anthropological and ethnographic literature for the other ethnic groups.

As in most of sub-Saharan Africa (see Kuper 1982; Meekers 1992, 1993, 1994b; Adams and Mburugu 1994; Isiugo-Abanihe 1994b), marriage in Mozambique is a process with a varying number of potential stages, sometimes lasting over years. For the patrilineal Tsonga-speaking people of the Southern Region, this process is characterised by the negotiation and payment of bridewealth (*lobolo*). In fact, the *lobolo* payment is by far the largest and the most important of the prestations and counter-prestations that accompany the establishment of a marriage (Kuper 1982:109).

The Tsonga marriage process starts with the suitor approaching the girl's family to announce his intentions. He is usually accompanied by one or two members of his family, and announces his intentions by saying that he is asking for a calabash of water. If there is more than one girl in the family, he is asked to point out or say the name of the girl he is interested in. After this, he is left alone with the girl and he asks her to be his future wife[8]. If the girl agrees, the boy promises to marry her (*Ku wuta* or *ku buta*) by paying an amount of cash, which according to some respondents, was about 120 Escudos[9] up to 25 or 30 years ago. If the girl accepts, members of the boy's family visit at a later date to start the negotiation of the bridewealth (*lobolo*) payment. From this point until the beginning of the negotiation both families conduct a rigorous investigation of each other and of the character of the bride or groom. This investigation is mainly aimed at finding out whether the other family is a 'good family' in relation to such aspects as having a history of stealing, quarrelling, witchcraft, barrenness or any other behaviour that would tarnish both families' names.

In the negotiation of the *lobolo*, the girl's family gives to the boy's family a 'list' of what is needed for their daughter's marriage. This 'list' includes the *lobolo* itself and clothing for the girl's parents, her paternal aunt (*bahani*) and her mother's family (*wa kokwani*). The *lobolo*, which was initially paid in hoes and cattle, has increasingly been paid in cash since the end of the nineteenth century. According to Kuper (1982:109), although cattle were the ideal *lobolo* medium, Southern Mozambique was an unhealthy area for livestock and they were scarce. The *lobolo* among the Tsonga is aimed at compensating the loss of a family member when the wife moves to her husband's family; guaranteeing the husband the rights to the sexual and economic services of the wife; and giving the husband and his family rights to the children borne by the wife (see also Rita-Ferreira 1968). *Lobolo* also stabilises the union since in the case of divorce it would have to be returned, and, since it was mainly used to acquire a wife for the bride's brother if she divorced, he (the bride's brother) would himself be obliged to divorce in order to recover the *lobolo* to pay back his brother-in-law (Rita-

[8] This was the first meeting between the boy and the girl. However, nowadays, the boy goes to the girl's family after having agreed with her on the issue, and in some cases it is the girl who tells her parents that someone is coming to ask for her hand in marriage.

[9] Escudo was the currency during the colonial period. It was not possible at the time of writing this thesis to determine the worth of the currency at that time.

Ferreira 1968; Junod 1974; Kuper 1982). The *lobolo* also represents gratitude from the groom to his father-in-law for having raised his wife.

The clothing that is given to the bride's mother's family (*wa kokwani*) is in recognition of their role in raising the woman who became the bride's mother. Some respondents pointed out that not acknowledging the contribution of *wa kokwani* could bring misfortune such as infertility. According to Junod (1974:258-259) the *wa kokwani* were entitled to a special part of the slaughtered animal (usually a cow) for the *lobolo* ceremony and a special present, usually a live calf.

The contribution of the bride's paternal aunt in bringing up the bride is also acknowledged by clothing. The paternal aunt is usually the assistant of the girl (her niece) when she reaches menarche. To prevent her from becoming pregnant before marriage, which is shameful for both the girl and her family, the paternal aunt usually 'keeps her childbearing capabilities' by hiding her first menses. It is believed that if the menses do not get any air she cannot get pregnant even if she engages in an act of unprotected sexual intercourse (see also Wamir 1995). On her marriage, the aunt is supposed to 'open her childbearing capabilities' by uncovering the menses and there is a fear that if the aunt is not given anything for her niece's marriage she may not uncover the menses, leaving her infertile. The importance of the paternal aunt in relation to her niece's marriage may also be related to the source of the money that was used to pay the bridewealth for her mother. As stated earlier, the *lobolo* received from the aunt's marriage was (and may still be) used to pay the *lobolo* for her brother's, the bride's father's marriage. Since it is the aunt's marriage that made her brother's family possible, she is in a position of special authority over the children of his marriage (Meekers 1993:43-44).

When the groom's family has gathered all the items in the list, they advise the bride's family in order to arrange the date for the *lobolo* ceremony. This is attended by the members of both families and represents the public and social sanctioning of the union. After this ceremony, the couple is considered married and the members of the bride's family accompany her to her new home. The transfer of the bride to her husband's home may be delayed if the *lobolo* has not been paid in full. However, there are cases where the agreement between the families is reached in order to transfer the bride to her husband's home before the completion of the *lobolo*. Sometime this occurs when the girl becomes pregnant before the engagement had been formalised. In such situations, apart from the *lobolo*, the 'offender' (groom) has to pay a 'damage fine' to the father of the girl to compensate for an unlawful pregnancy. According to some respondents, if the wife dies before the *lobolo* has been paid while she has already been living in her husband's compound, her family demands its full payment before her burial, *ku lowola nkele* (literally, bridewealth for the grave)[10]. This is because the husband has to formally tell his in-laws that their daughter has died and since the *lobolo* has not been paid he is not recognised as her legitimate husband. By paying the owed bridewealth he gains legitimacy to formally inform his in-laws about her death.

Ethnographic studies of the Sena/Ndau ethnic group, which is also patrilineal, suggest a marriage process similar to that described for the Tsonga (Rebelo 1948; Brites 1960; Ferreira 1960; Meekers 1993, 1994b). In describing the marriage process among the Shona (a cluster which includes the Sena/Ndau-speaking group) of Zimbabwe, Meekers (1993) identified three stages: the exchange of love tokens; the approval of the girl's paternal aunt; and the negotiation and payment of the bridewealth. The exchange of the love tokens represents the beginning of the private engagement between the young couple and happens before the family becomes involved in the relationship. The paternal aunt appears to have a more important role than among the Tsonga, because according to Meekers (1993:43-44), among the Shona the aunt's discussion with the girl's boyfriend is an important event in the marriage procedures and determines whether the relationship should go ahead or not. If the paternal aunt approves the relationship the negotiation and payment of the bridewealth complete the marriage process, as in the case of the Tsonga.

For the matrilineal ethnic groups (Macua, Lomwe/Chuwabo) the available ethnographic literature suggest considerable differences in their marriage process from the Tsonga and Sena/Ndau (Cavaleiro 1956; Conceição 1960; Martinez 1989; Pequenino 1995). Martinez (1989), for the Macua, and Pequenino (1995), for the Lomwe, do not mention any kind of payment from the groom to the bride's father. According to Martinez (1989) the Macua marriage has three stages: the negotiation period, the period of proof, and the community party. The negotiation period involves the young couple as well as their families and ends with the groom moving to the bride's family. In the second stage the young couple lives as any normal couple and both the groom and the bride show their qualities. The groom needs to convince the bride's family that he is an adult, hard-working, capable of fathering

[10] Solway (1990:45) also reports that among the Bakgalagadi of Botswana the bridewealth can be paid after the death of the wife.

children, feeding a family, building a house and defending his wife against all dangers. The bride, on the other hand, has to demonstrate that she is capable of conceiving and bearing children, looking after her husband and the house, cooking and farming. If during this phase one of the partners is not satisfied with the other, the process can be terminated and the man returns to his home. If both sides are happy with each other, then the third and last phase, which usually occurs after the bride has given birth to the first child, takes place. This is the social recognition of the marriage and takes the form of a public party involving the members of both families and the community in general.

In summary, in both patrilineal and matrilineal ethnic groups marriage has several stages and the marriage process may go on for a period longer than a year. While patrilineal (Tsonga and Sena/Ndau) marriage is centred on the payment of bridewealth, in matrilineal marriage (Macua, Lomwe and Chuwabo) such payments do not exist or are small. This distinction may be important in determining the timing of marriage because the practice of bridewealth may require more time for a young man to gather resources for the marriage resulting in later marriage than in ethnic groups where bridewealth is not required. Also, divorce may be easier where there is no bridewealth payment than where bridewealth is practised, since the divorce may require bridewealth to be returned to the husband. Differentials in marriage patterns are assessed in the following sections.

5.3 Age at marriage and the proportion marrying

This section uses census and DHS data to evaluate the trends and differentials in age at marriage. It begins by discussing national and regional trends in age at marriage and the proportion marrying, which is then followed by an analysis of socio-economic differentials in age at marriage using a multivariate approach.

5.3.1 National and regional trends

Table 5.1 presents the percentage of women never married for selected age groups by region based on reported marital status in the 1980 and 1997 censuses. Marriage takes place relatively late in Southern Region, and early in Northern Region, in particular Nampula province (see Appendix Table E5.1), with Central Region occupying an intermediate position. The data in Table 5.1 also show an increase overtime in the percentage of never-married at all ages, reflecting a trend towards marriage postponement. The national percentage of women 15-19 who have never been married increased from 47 per cent in

1980 to 55 per cent in 1997. A slightly bigger increase (13 percentage points) occurred in the Southern Region than in Central (8 percentage points) and Northern Regions (only 2 percentage points). There was also a slight increase (2.5% to 6.1%) in the percentage of women aged 45-49 who were never married. If the percentage of women aged 45-49 who have never been married is taken as a measure of non-marriage, the data presented in Table 5.1 show that marriage is still nearly universal in Mozambique.

Table 5.1 Percentage of women never married by region, Mozambique 1980 and 1997

Region	1980				1997			
	15-19	20-24	25-29	45-49	15-19	20-24	25-29	45-49
Northern	34.4	6.1	3.6	3.1	36.3	10.3	7.2	8.0
Central	43.8	7.3	3.2	1.8	52.0	13.5	6.7	4.0
Southern	63.1	16.9	7.7	2.7	76.1	34.0	18.8	6.4
Mozambique	46.8	9.6	4.5	2.5	54.8	17.7	9.7	6.1

Source: Computed from 1980 and 1997 Censuses.

Changes in nuptiality patterns can be measured by the singulate mean age at marriage (SMAM), a measure of average age at first marriage computed from the proportions never married by age (Hajnal 1953). By using current status data SMAM is more reliable than measures based on retrospective reports from surveys which are more subject to reporting errors (van de Walle 1993:130-131). However, SMAM is vulnerable to age mis-reporting and assumes unchanging marriage patterns. SMAM is overestimated when age at marriage has been increasing (see Booth 2001). The assumption of constant marriage pattern can be relaxed by calculating SMAM based on the proportions never married of a hypothetical intercensal or inter-survey cohort, if data from two points in time are available (United Nations 1983:227). Although the data for this study are from two censuses, the lag between the censuses (17 years) does not allow the construction of an intercensal cohort from which intercensal SMAM could have been estimated. Thus, the estimates presented in Table 5.2 are based on single cross-sections from the 1980 and 1997 censuses.

According to the estimates presented in Table 5.2, the national SMAM rose by only just over half a year (0.6 years) between 1980 and 1997. The biggest rise in SMAM occurred in the Southern Region (2.2 years) especially in the provinces of Maputo and Maputo City (about 3 years each, see Appendix Table E5.2). The Central Region, especially in Sofala, also experienced a slight increase in SMAM between the two censuses, while there was a slight decrease in the Northern Region. The regional pattern in SMAM estimated from the DHS is consistent with that from the census but the latter is slightly lower for Central and

Southern Regions and higher in Northern. Such differences may be related to differential reporting errors or sampling error in the DHS. The median and mean age at first marriage (also presented in Table 5.2) estimated from the 1997 DHS also show a similar regional pattern to that of SMAM but they tend to be younger than SMAM reflecting, perhaps, an upward bias in SMAM due to increasing age at marriage and/or the processual nature of marriage and recall problems of age at marriage. According to van de Walle (1993:131) current reports of marital status may underestimate the prevalence of unions that, with the benefit of hindsight, would turn out to have been the beginning of a marriage that withstood the test of time; conversely, retrospective reports may trace the beginnings of a union to its earliest signs of viability. On the other hand, retrospective reports may be subject to recall problems, and women may instead of reporting their ages at the time of marriage, report the age at which it is believed that girls should be married in a particular society.

Table 5.2 Singulate mean age at marriage, median age at first marriage by region, Mozambique 1980 and 1997

	Census SMAM				1997 DHS		
Region	1980	1997	Absolute change	% Change	SMAM	Median[a]	Mean
Northern	16.3	15.5	-0.8	-4.4	16.6	15.6	15.7
Central	17.2	17.9	0.7	4.1	17.0	17.2	16.7
Southern	19.2	21.4	2.2	11.7	19.9	18.8	18.2
Mozambique	17.5	18.1	0.6	3.8	18.0	17.3	16.8

Note: a Computed through life table techniques to account for censoring.
Source: Computed from 1980 and 1997 Censuses; 1997 DHS.

The timing of marriage described above can be compared with Lesthaeghe's (1984:20) classification of nuptiality regimes in sub-Saharan Africa. In his study of 23 countries and sub-regions of sub-Saharan Africa Lesthaeghe (1984:20), distinguished four nuptiality regimes:

(i) Early marriage pattern, with percentage single among women aged 15-19 less than 30 and SMAM less than 16.7 years;

(ii) Medium-low pattern, with percentage single among women aged 15-19 between 30 and 49.9, and SMAM between 16.7 and 17.9 years;

(iii) Medium-high pattern, with percentage single among women aged 15-19 between 50 and 69.9, and SMAM between 18 and19.6 years; and

(iv) Late marriage pattern, with percentage single among women 15-19 of 70 or higher, and SMAM of 19.7 or higher.

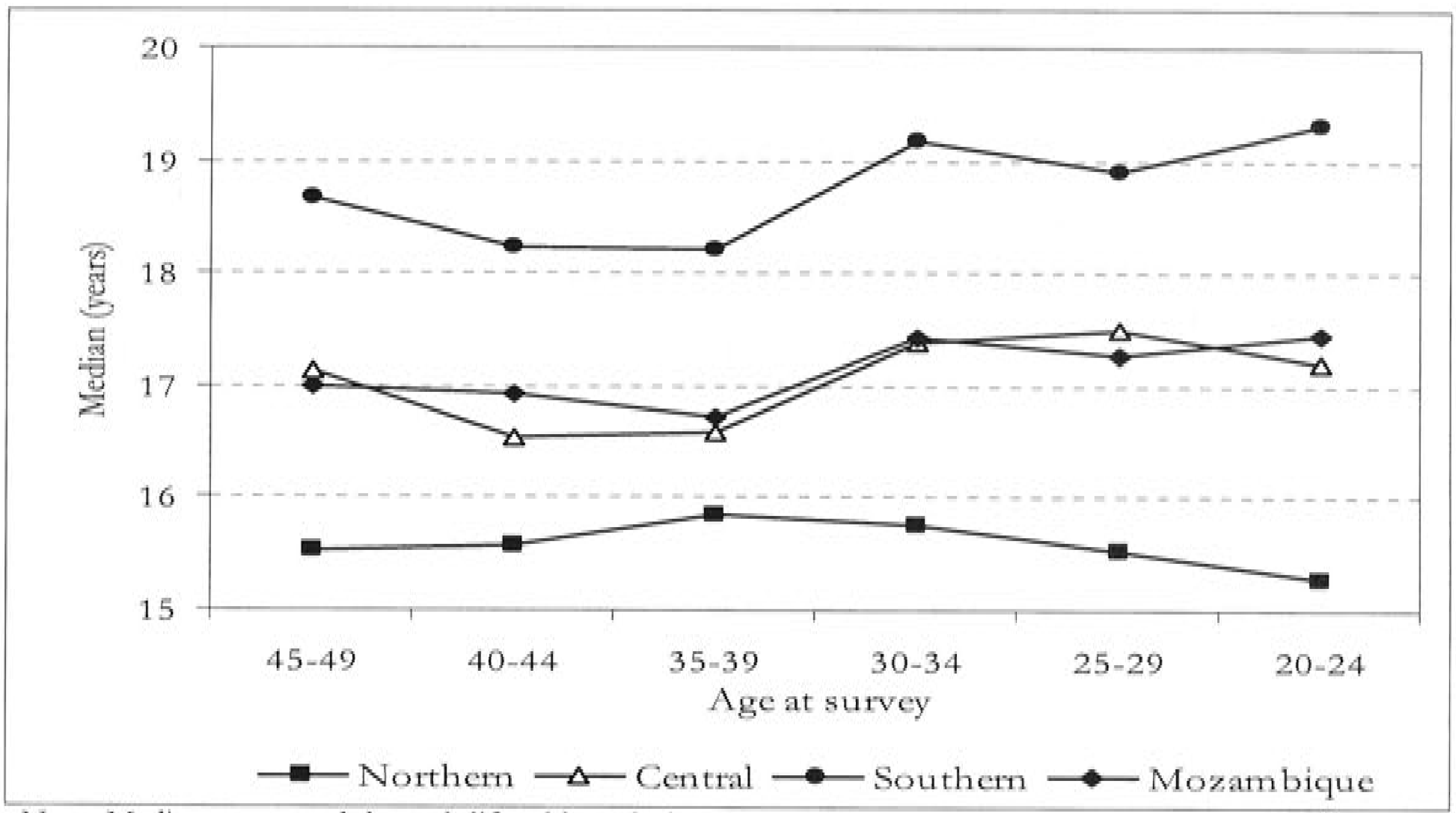
According to this classification Mozambique moved from a 'medium-low' marriage pattern in 1980 into a 'medium-high' pattern in 1997. This classification confirms the relatively early marriage in Mozambique and the very slow move towards a late marriage pattern. One reason for this pattern is the early marriage pattern that characterises the Northern and Central Regions where, according to the 1997 Census, more than 74 per cent of the country's population live. By Lesthaeghe's categorisation, Northern Region's marriage pattern was 'early' and Central Region 'medium-low' in both the 1980 and 1997 Censuses. In contrast, Southern Region, with only 26 per cent of the country's population in 1997, moved from 'medium-high' in 1980 to 'late' marriage pattern in 1997.

The trend in age at first marriage can also be assessed by computing the median age at marriage by cohort at the survey. Figure 5.1 shows the result of such a computation by region. The median is almost the same at the older cohorts (35-39 and over) and decrease with age of woman in all but northern Region at the younger cohorts (below 35-39), implying an increasing age at marriage, which is inconsistent with the trends showed by the change in SMAM between 1980 and 1997 (Table 5.2). The estimation of cohort changes in age at marriage based on the retrospective reports of a single survey may be biased by reporting errors, especially the over-reporting of age at marriage by older women (Lesthaeghe, Kaufmann and Meekers 1989; van de Walle 1993). The examination of WFS data by Lesthaeghe et al.(1989:245) found that over-reporting of the age at first marriage was a typical phenomenon for older women. Thus, the apparent stagnation of the median age at marriage at the older cohorts (Figure 5.1) may be related to this phenomenon.

It appears that the median age at marriage did not change very much during the turbulent wartime and 'economic crisis' period of the 1980s. It has been argued (Lee 1990; National Research Council 1993b; Palloni et al. 1996) that postponement of first marriage may be a common response to the uncertainty and economic slowdown that often result from political instability. If this was the case, and taking the estimated median at face value, the median age at marriage for the cohorts 30-34 and 35-39 would be higher than for the preceding and succeeding cohorts, since the majority of these women would have married during the war period. There is only an indication that this may have been the case for the cohort 30-34 in Southern and Central Regions, and for both cohorts in Northern Region. Also, since this association is likely to be strong in societies practising bridewealth payment and where a newly married couple is expected to establish an independent household, with a perceived need for a certain level of financial security before marriage (National Research

Council 1993b; Palloni et al. 1996), one would expect the effect to be stronger in Central and Southern Regions than in Northern, and in urban than in rural areas, but there is only some evidence in relation to regional differences (see Figure 5.1) and none for urban-rural differences (see Appendix Figure E5.1).

Figure 5.1 Median age at first marriage by cohort and region, Mozambique 1997 DHS



Note: Median computed through life table techniques to account for censoring.
Source: Computed from 1997 DHS.

5.3.2 Determinants of age at first marriage: a multivariate analysis

The age at which a woman enters a sexual union is subject to the influence of her socio-economic characteristics. Although no study has investigated the influence of socio-economic factors on age at marriage in Mozambique, research in many parts of the world has highlighted the importance of these factors in determining age at marriage (McCarthy 1982; Trussell and Bloom 1983; United Nations 1987; Lesthaeghe et al. 1989; Njogu 1989; Isiugo-Abanihe, Ebigbola and Adewuyi 1993; Jones 1994, 2001; De Silva 1997; Shaikh 1997; Bracher and Santow 1998; Kinfu Ashagrea 2001). Age at marriage tends to be higher among educated than uneducated, urban than rural (see Table 5.3), and women with working experience before marriage than women without it. Apart from delaying marriage until studying is completed, the attainment of high levels of education increases women's career aspirations and chances of entry into employment (Singh and Samara 1996; Diamond et al. 1999), which in turn provide the economic resources and independence that reduce the economic motivation for early marriage (Singh and Samara 1996; Bracher and Santow 1998). Educated women also have a narrowed range of potential partners since it is common for women to marry men who are at least as educated as themselves (Singh and Samara 1996; Basu 1999; Diamond et al. 1999). Because both schooling and employment opportunities, as well as other aspects of modernisation that favour marriage postponement, are greater in urban areas, age at marriage tends to be higher among urban than rural residents (Cochrane 1983; Singh and Casterline 1985; Singh and Samara 1996).

Ethnic and religious affiliation has also been linked to the timing of marriage (McDonald 1985; Lesthaeghe et al. 1989; Isiugo-Abanihe et al. 1993; Kaufman and Meekers 1998; Jones 2001). One of the important ethnic differentials in age at marriage is between matrilineal and patrilineal systems of organisation. It is generally believed that marriage is later among matrilineal than among patrilineal ethnic groups (McDonald 1985; Lesthaeghe et al. 1989; Kaufman and Meekers 1998). This is partly because later marriage may be associated with the greater independence of women, which is more likely to be found in a matrilineal lineage than in a patrilineal one (Kaufman and Meekers 1998). The literature on the relationship between religion and age at marriage, as well as the bivariate analysis presented in Table 5.3, suggests that Muslim women marry earlier than Christians (McDonald 1985; Lesthaeghe et al. 1989; Jones 1994; Audinarayana and Rajasree 1995; Heaton 1996; Kaufman and Meekers 1998): Islam depresses female literacy and encourages early marriage as a result of a tighter control over women and partner selection (Lesthaeghe et al. 1989).

In order to examine the relationship in Mozambique, the present section applies multivariate techniques to the 1997 Census and DHS and examines the effects of education, employment status, religion, ethnicity, place of residence, age, radio ownership and region of residence on woman's age at first marriage. Since information on age at marriage was not collected from the 1997 Census, a dichotomous variable indicating whether or not a woman aged 15-19 has ever been married was constructed from the information on current marital status. A 0.5 per cent random sample of about 12,000 women, was drawn from the data set of women aged 15-19, and a logistic regression model was fitted to determine whether individual socio-economic differences in the probability of ever having been married among women aged 15-19 remain sizeable and statistically significant once other socio-economic factors are held constant.

Table 5.3 Percentage of women never married and SMAM by selected socio-economic characteristics, Mozambique 1997

Socio-economic characteristics	% never married			SMAM
	15-19	20-24	25-29	
Place of residence				
Urban	70.2	29.5	16.0	20.2
Rural	47.4	12.8	7.3	17.2
Education				
No education	41.8	11.7	7.4	16.7
Primary	67.3	21.6	11.7	19.5
Secondary or higher	90.0	60.9	32.2	23.6
Ethnicity				
Tsonga	73.1	30.1	16.6	20.9
Sena/Ndau	50.9	13.9	6.3	18.0
Lomwe/Chuwabo	47.8	11.2	6.3	17.3
Macua	32.0	9.1	6.7	15.2
Other local	45.5	13.1	8.9	16.8
Portuguese/foreigner	83.9	47.3	25.3	22.4
Religion				
Catholic	57.5	19.3	10.1	18.5
Protestant	55.8	17.7	9.7	18.2
Muslim	40.1	12.5	8.4	16.0
Zionist	62.8	21.9	11.7	19.3
Other religion	61.4	21.1	10.9	19.2
No religion	50.4	15.2	8.0	17.8

Source: Computed from 1997 census.

For the DHS data set the dependent variable is the reported age at marriage. Because the age at marriage is unknown for women who were-never married at the date of the interview, but who will eventually marry some time in the future (censored cases), a proportional hazards model is used to analyse the data: see details including the proportional hazard equation in Appendix A. The proportional hazards model is a life table technique which is adequate for the analysis of censored data and has widely been used in demographic analysis (see Trussell and Bloom 1983; Halli and Rao 1992; Le 1997; Bracher and Santow 1998; Heaton and Forste 1998; Hosmer and Lemeshow 1999; Kinfu Ashagrea 2001).

The results of the net effect of socio-economic factors on age at marriage are presented in Table 5.4. The first two columns provide the β coefficients (column 1) and the odds ratios (column 2) of a woman aged 15-19 ever having been in a union compared with a woman in the reference category, estimated from the 1997 Census. The last two columns present the β coefficients (column 3) and the relative risk (column 4) of first marriage associated with each covariant relative to the risk for the reference category, estimated from the 1997 DHS. The odds ratio and the relative risk for the reference category of each independent variable is equal to unity $(e^0 = 1)$. Thus, a value of 1.0 for any of the other categories means that the variable category in question has the same effect as for the reference category on first marriage timing (Halli and Rao 1992:158). A e^{β} value higher than one indicates a greater likelihood or risk of marriage than the reference category, whereas values less than one indicate a lower likelihood or risk of marriage.

In general, the results from the two data sets are consistent with one another. Education increases age at marriage. The relative risk of entering into first marriage is 13 per cent for women with primary education and 41 per cent for those with secondary education lower than that for uneducated women.

Paid employment also increases age at marriage, but there is no agreement between the results from the census and those from the DHS in relation to the effect of self-employment: the census shows a positive and the DHS a negative effect. The reason for this inconsistency is unclear. But, it is important to note that these results may be misleading because employment status at the time of the census or survey, as used in this analysis, may not be the same as before marriage. The delaying effect of women's employment is through the alternative economic productivity it provides for never-married women to postpone marriage (Kasarda et al. 1986; Singh and Samara 1996; Diamond et al. 1999; Kinfu Ashagrea 2001), and the employment status variable as used in this analysis does not refer to the labour force participation of never-married women but to labour force participation of all women at the time of the survey.

Table 5.4 Odds ratios of ever having been married for women aged 15-19, and Cox Regression relative risk of first marriage by socio-economic characteristics, Mozambique 1997

Socio-economic characteristics	Ever married women 15-19		First marriage	
	Regression coefficient (β)	Odds ratios (e^{β})	Regression coefficient (β)	Relative risk(e^{β})
Education				
No education ®	0.000	1.000	0.000	1.000
Primary	-0.308	0.735 ***	-0.135	0.874 ***
Secondary or higher	-0.250	0.779	-0.497	0.608 ***
Employment status				
Not working ®	0.000	1.000	0.000	1.000
Unpaid worker	0.079	1.082	-0.039	0.961
Self-employed	1.370	3.935 ***	-0.085	0.919 **
Paid worker	-0.522	0.594 *	-0.189	0.828 *
Religion				
Catholic ®	0.000	1.000	0.000	1.000
Protestant	0.012	1.012	0.023	1.023
Muslim	0.101	1.107	-0.098	0.907
Zionist	0.162	1.176	0.056	1.057
Other religion	0.128	1.136	0.013	1.013
No religion	0.262	1.300 ***	-0.006	0.994
Ethnicity				
Tsonga ®	0.000	1.000	0.000	1.000
Sena/Ndau	0.262	1.299	0.072	1.074
Lomwe/Chuwabo	0.379	1.460 *	0.308	1.361 **
Macua	0.942	2.566 ***	0.123	1.131 *
Other local	0.232	1.261	0.198	1.219 *
Portuguese/foreigner	-0.084	0.919	-0.052	0.950
Place of residence				
Urban ®	0.000	1.000	0.000	1.000
Rural	0.551	1.735 ***	0.067	1.069
Household owns radio				
Yes ®	0.000	1.000	0.000	1.000
No	-0.173	0.841 **	0.002	1.002
Region				
Northern	0.887	2.427 ***	0.480	1.617 ***
Central	0.577	1.781 ***	0.167	1.182 *
Southern®	0.000	1.000	0.000	1.000
Age	0.569	1.766 ***	-0.031	0.969 ***
Constant		-11.3 ***		
- 2 Log likelihood		10559.0		87869.8
Chi-square		6108.8 ***		758.9 ***
No. of cases		12124		5777

Notes: ® Reference category; *p≤0.05; **p≤0.01; ***p≤0.001.
Source: Computed from 1997 Census and 1997 DHS.

The effect of ethnicity remains very significant after other socio-economic characteristics are accounted for. With the exception of the 'Portuguese/foreigner' category, which has a very diverse composition, all the categories exhibit earlier marriage than the Tsonga (the reference category), but only the coefficients for Lomwe/Chuwabo, Macua and 'Other' (DHS based analysis only) ethnic groups are statistically significant at 5 per cent level. Considering the lineage system, the data show that the patrilineal ethnic groups (Tsonga and Sena/Ndau) have a later marriage pattern than the matrilineal ethnic groups (Lomwe/Chuwabo and Macua), although the difference between the Sena/Ndau and the Lomwe/Chuwabo is not statistically significant. This is in contrast to the literature on other parts of Africa (McDonald 1985; Lesthaeghe et al. 1994; Kaufman and Meekers 1998) which suggests later marriage patterns among women in matrilineal systems of social organisation than in patrilineal societies. In regard to the Macua women, who have the earliest age at marriage, early marriage has been reported in the ethnographic literature (see Conceição 1960; Lopes 1960). Conceição (1960:12) reported that Macua girls could marry between ages 8 and 10, while for Lopes (1960) the engagement could happen even before age 6. However, because Macua marriage is a process of at least three stages, these ages may not refer to the beginning of cohabitation but the beginning of the process leading to it.

The later than average marriage among the Tsonga and Sena/Ndau may reflect a greater importance given to the bridewealth payment in the marriage process of these groups. Since the value of bridewealth is continually rising and the parents are no longer in a position to pay bridewealth for their sons, men in these societies may need more time to gather the necessary resources to meet the costs of marriage than men in matrilineal ethnic groups (Macua and Lomwe/Chuwabo) where bridewealth is not required (see Isiugo-Abanihe 1994b on Nigeria; Dyson-Hudson and Meekers 1996 on Kenya). Although this is more likely to affect males than females, a woman who does not want to marry a polygynist may be forced to wait for a long time to find a man with enough resources, or for her boyfriend to gather the resources, to meet the costs of marriage. For the Tsonga, the late marriage may also reflect high male migration either to South Africa or to Maputo City (McDonald et al. 2000; Arnaldo 2001), perhaps to gather resources for marriage, which may raise age at marriage for women by creating a shortage of males of marriageable age.

Religion does not have a significant effect on age at marriage when women's other socio-economic characteristics are held constant, though the analysis based on the census data set shows that women aged 15-19 not affiliated to any religion are 30 per cent more likely to have ever been married than the Catholics. These findings suggest that the religious differentials in age at marriage shown by the bivariate analysis (Table 5.3) are not due to religion itself but to differences in the individual characteristics of women affiliated to different religious groups. This is in contrast to some studies in sub-Saharan Africa where religious differences persisted even after socio-economic controls had been introduced (e.g. Njogu 1989, for Kenya; Kinfu Ashagrea 2001, for Addis Ababa). A study in Kenya by Njogu (1989:Table 5.3) found that women of African traditional religion married earlier than women of other religions, and in Addis Ababa Kinfu Ashagrea (2001:Table 5.15) reported that Other Christians married later than Coptics and Muslims.

The effects of place of residence, radio ownership and region appear to be in the expected direction. The odds ratio that a woman aged 15-19 has ever been in a union is 74 per cent higher in rural than in urban areas, although the DHS-based analysis shows a risk of marriage for rural women only 7 per cent higher than for urban women. This may reflect differing conditions between rural and urban areas. Urban areas are characterised by factors such as industrial occupational structure with better schooling and employment opportunities, and greater exposure to many aspects of modernisation and development, that favour marriage postponement (Cochrane 1983; Singh and Casterline 1985; Singh and Samara 1996).

In relation to radio ownership, initially regarded as a proxy of household living standards, the results from the two data sets are contradictory. While the DHS does not show a significant effect, the census suggests earlier marriage for women in households with a radio than those living in households without a radio. The reason for this contradiction is unclear but radio ownership may not be a good indicator of household living standards.

The regional differentials observed in the bivariate analysis still persist after women's socio-economic characteristics have been controlled for. The risks of marriage for women in Central and Northern Regions are 18 per cent and 62 per cent higher, respectively, than the risk of marriage for women in Southern Region. Since individual characteristics have been controlled for, these differences may reflect differences in the socio-economic structures of the regions, which were discussed in Chapter 1.

5.4 Polygyny

This section discusses the levels and differentials of polygyny in Mozambique. It begins by discussing the main factors associated with the prevalence of polygyny in sub-Saharan Africa. The levels and socio-economic differentials are then examined by computing the polygyny ratios from the 1997 Census and the proportion of women who reported being in polygynous marriages from the 1997 DHS. The analysis is completed by fitting a logistic regression model to the DHS data to determine the net effects of women's socio-economic characteristics on the odds of being married to a polygynist.

5.4.1 Factors associated with polygyny in sub-Saharan Africa

Polygyny is an important feature of sub-Saharan nuptiality regimes (Burch 1983; Goldman and Pebley 1989; Lesthaeghe 1989; Lesthaeghe et al. 1989; Pebley and Mbugua 1989; Ezeh 1997). Its prevalence and persistence in sub-Saharan Africa have been explained by economic, cultural and demographic factors. The economic explanation links polygyny to women's role in agricultural production (Boserup 1970; Clignet 1970; Jacoby 1995). Polygynous societies usually have principles of division of labour that lead women to carry out a substantial part of the agricultural activities of the household (Clignet 1970). According to Boserup (1970) societies with low agricultural technology are characterised by two farming systems: female and male systems. In female system areas, which have low population density, shifting cultivation is practised and women do most of the work which, consequently, enhances their economic value to men, resulting in high levels of polygyny. In these societies, men are motivated to have many wives and children because their wives and children serve as cheap labour and as a means to expand their ownership of farm land (Hayase and Liaw 1997). On the other hand, in male farming systems, with dense settlement, men do the agricultural work with more advanced technology (plough and irrigation), and women's contribution is reduced. Thus, in these societies, women are an economic burden to men, resulting in monogamy.

The institution of polygyny in sub-Saharan Africa is also rooted in the cultural practices of long female postpartum sexual abstinence, and the rapid remarriage of separated, divorced and widowed women, especially the practice of levirate, a custom requiring a man to marry his brother's widow (Hayase and Liaw 1997). The levirate provides economic support and social standing for a woman who otherwise might have no acceptable social role (Burch 1983). African tradition also values ancestry and descent and condemns infertility or few children (Caldwell et al. 1992). This means that subfecundity or infertility of the first wife provides enough reason for the husband to resort to polygyny in order to meet his reproductive goals. Indeed, it is normal in sub-Saharan Africa for a man whose first wife is infertile to take a second wife (Lesthaeghe et al. 1989).

The observed high fertility and sex differences in age at marriage also create favourable conditions for polygyny. Goldman and Pebley (1989) described the demographic conditions that allow polygyny to occur. Using data from Cameroon, Senegal and Northern Sudan and applying the stable population theory these authors examined the age distributions by sex and found that there was a substantial surplus of women relative to men that could contribute to high prevalence of polygyny. They singled out the difference in age at marriage between men and women and the extent of widow remarriage as the major factors permitting high levels of polygyny in the subregion (Goldman and Pebley 1989:233).

Polygyny can be advantageous to both men and women. For men, polygyny is seen as prestigious and can also mean greater wealth through labour supply and high status. For example, Gwako (1998) reports that among the Logoli of Western Kenya marrying more wives was one of the most common ways men used to enhance both their status and networks of kinship relations. Older men not only extended their spheres of influence through polygyny, but also felt more comfortable with wider groups of people related to them by blood and marriage (Gwako 1998:336).

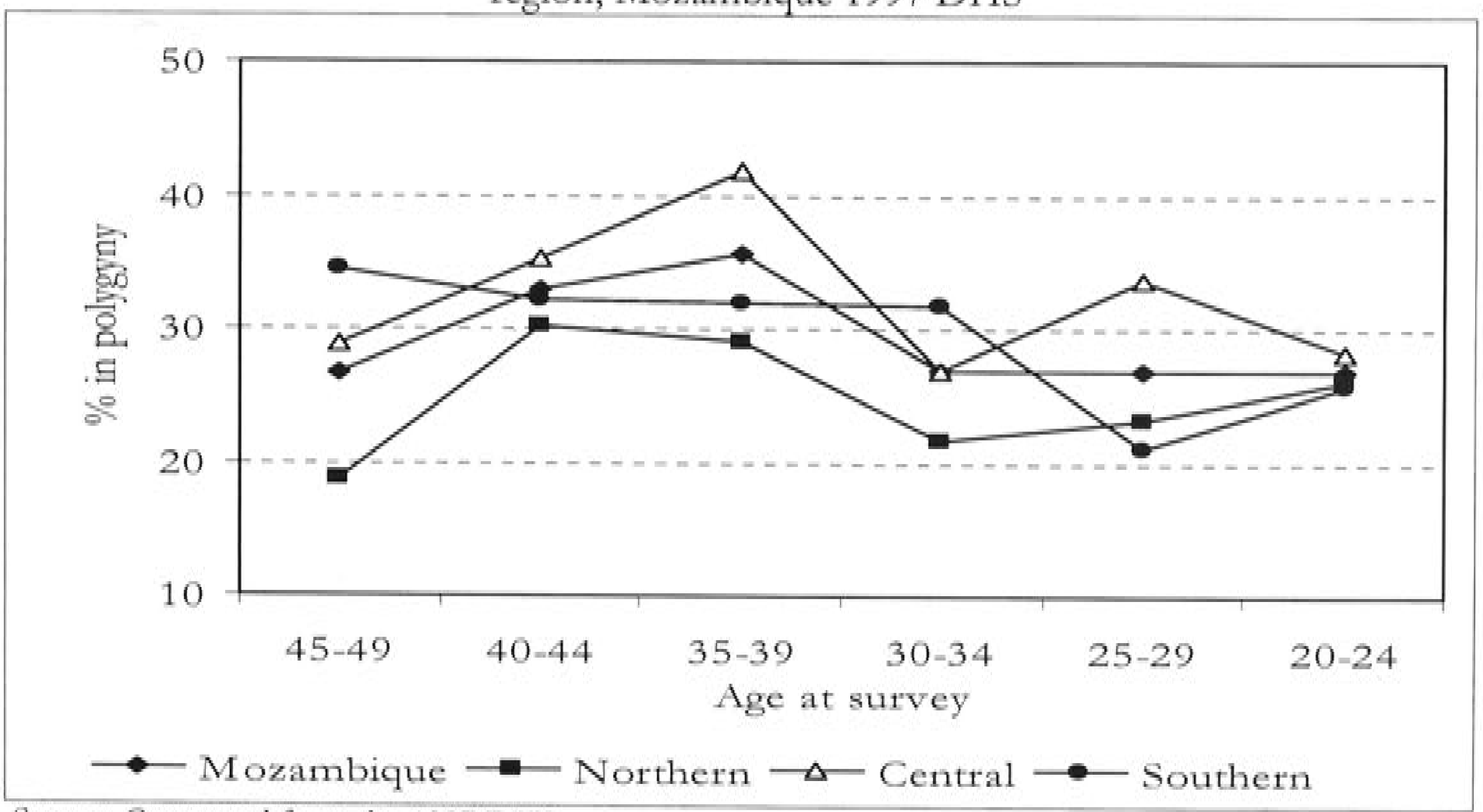
For women, the advantages of polygyny include support, solidarity and companionship with co-wives, help with childcare, farming and other domestic activities, and relief from sexual duties (Lesthaeghe et al. 1989; Adams and Mburugu 1994; Meekers and Franklin 1995; Anderson 2000). In some sub-Saharan African societies, the participation of senior wives in the choice of their husband's next wife gives them the opportunity to maximise their economic and other benefits by selecting hard-working co-wives, and to limit intra-family conflicts by choosing junior wives they like, sometimes a sister (Meekers and Franklin 1995:315). Also, by sharing their chores with other women, polygynous women may see themselves with more freedom of movement and leisure time than their counterparts in monogamous marriages (Solway 1990:49).

However, the competition of co-wives and their children over the husband's attention may create instability in the union (Adams and Mburugu 1994; Meekers and Franklin 1995). Co-wives tend to compete with one another to gain legitimate access to rewards provided by their husband or his family, and such competition can lead them to display aggressive feelings toward each other, especially when the husband's love and resources are not shared equally between them and their children (Clignet 1970:41; Adams and Mburugu 1994:160). Most Kaguru women of Tanzania who were interviewed by Meekers and Franklin (1995) stated that polygynous men tend to favour the junior wife over the senior, a situation which also affects her children.

5.4.2 Levels and differentials of polygyny in Mozambique

Polygyny is widespread in Mozambique. According to the 1997 DHS 28 per cent of currently married women live in polygynous unions. In contrast to some southern African countries such as Botswana, where polygyny has been declining since the beginning of the twentieth century (Timæus and Graham 1989), in Mozambique polygyny appears to be resistant to decline. The percentage of married women in polygynous unions increased from 25 per cent in 1970 (United Nations 1990:Table 8) to 28 per cent in 1997 although the two figures may not be comparable. Figure 5.2 shows a slight increasing percentage of polygynous women by age, implying decreasing polygyny over time. The graph shows some fluctuation that may be attributed to age misreporting rather than to fluctuations in polygyny over time.

Figure 5.2 Percentage of currently married women in polygynous unions by cohort and region, Mozambique 1997 DHS



Source: Computed from the 1997 DHS.

Table 5.5 shows the polygyny ratios (the ratio of the number of currently married women to the number of currently married men) estimated from the census and the percentage of currently married women in polygynous unions estimated from the DHS. The level of polygyny is highest in Central Region, intermediate in Southern and lowest in Northern Region. This regional pattern is explained by the distribution of the major ethnic groups. Polygyny is high among the patrilineal Sena/Ndau and Tsonga in the Central and Southern Regions, respectively, and relatively low among the matrilineal Macua of the Northern Region. Matrilineal societies are expected to have a lower prevalence of polygyny than the patrilineal societies because the matrilocal or uxorilocal residence of spouses that characterises matrilineal societies makes it difficult for a man to bring a new wife home to his first wife's kin unless the two women are related (Lesthaeghe et al. 1989; Lesthaeghe et al. 1994; Kaufman and Meekers 1998). According to Clignet (1970:39-40), the domestic power of a polygynous husband over his wives in a matrilineal society is more limited than in a patrinileal society, where all female behaviour is directed towards the satisfaction of the husband and his family. This implies that a husband in a patrilineal society will be more inclined to polygyny than in a matrilineal society where potential sources of opposition to his power may increase with the number of wives. However, among the matrilineal Macua of Northern Mozambique polygyny is fairly widespread. The polygynous husbands reside at their senior wives' compounds and visit the other wives' compounds in turn (Martinez 1989).

Table 5.5 Polygyny ratios and the percentage of currently married women in polygynous unions, Mozambique 1997

	Polygyny ratio (Census)			% in polygynous unions (DHS)		
Region	Total	Urban	Rural	Total	Urban	Rural
Northern	1.10	1.07	1.11	23.0	22.0	23.1
Central	1.19	1.06	1.22	31.4	17.1	34.3
Southern	1.36	1.18	1.54	27.4	15.0	33.0
Mozambique	1.19	1.11	1.22	27.6	17.1	30.1

Source: Computed from 1997 census and 1997 DHS.

Polygyny is higher in rural than in urban areas. Other polygyny differentials include education and religion. Educated women are less likely to enter a polygynous union than the uneducated (Gage and Bledsoe 1994), and Christians are expected to be less polygynous than Muslims. While Christianity, especially Catholicism, is not tolerant of polygyny (Lesthaeghe 1989), Islam is allows polygyny only up to a maximum of four wives (Chamie 1986). The degree to which socio-economic factors are related to polygyny is assessed below through multivariate analysis. The dependent variable is a dichotomous variable indicating whether or not a woman is in a polygynous marriage. The independent variables include age, marital duration, parity, woman's education, woman's and husband's occupation, religion, ethnicity and place of residence.

Table 5.6 shows the regression coefficients (β) and the associated odds ratios (e^{β}) of a woman being in a polygynous union. The effect of woman's education on polygyny is in the expected direction. The higher the educational attainment of a woman, the less likely she is to be married to a polygynist. Women with primary and secondary or higher education are 11 per cent less likely, and those with secondary or higher education 59 per cent less likely to enter a polygynous marriage than their uneducated counterparts, but the coefficients and odds ratios are statistically significant only for women with secondary education. This finding is consistent with the argument that women who have attained a high level of education may have acquired a strong preference for monogamy (Timæus and Reynar 1998). However, research in West Africa (e.g. Gage and Bledsoe 1994; Karanja 1994; Mann 1994), suggests that although educated women are increasingly unwilling to accommodate themselves to a polygynous household, they are likely to be 'outside wives' of married men with means, a form of polygyny that does not require the same degree of familial commitment as 'formal polygyny'.

The effect of occupation on polygyny is also shown in Table 5.6. Women working in agriculture are more likely than non-working women to be in a polygynous marriage, but less likely than women in the white-collar category to be in such a marriage, though the difference is not significant. The association between women's agricultural work and polygyny seems consistent with the argument that where a major part of agricultural work is done by women, polygyny is likely to be widespread (Boserup 1970). However, men working in agriculture are less likely than other men to be polygynous. Only women whose husbands are not working are less likely to be polygynous than those with farmer husbands, while women whose husbands are white-collar workers or workers in other non-agricultural activity are 44 per cent and 12 per cent more likely, respectively, than those whose husbands work in agriculture to be in polygynous marriages. This finding suggests that men's socio-economic status is an important factor in determining their propensity to be polygynous, which seems consistent with some studies elsewhere in sub-Saharan Africa (Timæus and Reynar 1998). In their analysis of polygyny in five countries of sub-Saharan Africa, Ghana, Kenya, Senegal, Uganda and Zambia, Timæus and Reynar (1998) found that men involved in agricultural production were more likely to be polygynists in only one country (Zambia). In the other countries there were no significant differences between farmers and white-collar workers, but in Kenya farmers were less likely than other men to be polygynists, and white-collar men were less likely than non-agricultural men to be polygynous. According to Timæus and Reynar (1998:156) this pattern suggests that middle class men may be less motivated to marry polygynously than other men.

In relation to the effect of religion on polygyny, the results show that, other things being equal, women in the religious categories other than Catholics are almost twice as likely as Catholics to be polygynous. Women with no religion, most of whom are traditional believers, and the Zionists are the most likely to be polygynous. Muslims and Protestants also have a higher propensity to enter polygyny than Catholics. This pattern of relationship was expected. Christian churches, especially the Catholic Church, have been hostile to polygyny while Islam and African traditional religion sanction, or are more likely to be committed to, the institution (Lesthaeghe 1989; Lesthaeghe et al. 1989; Klomegah 1997; Timæus and Reynar 1998).

Differentials by ethnic affiliation in the odds that a marriage is polygynous are consistent with the tendency of patrilineal descent systems to be more polygynous than the matrilineal systems. The matrilineal Lomwe/Chuwabo and Macua women are 73 per cent and 60 per cent, respectively, less likely to marry a polygynist than the patrilineal Tsonga. On the other hand, no significant differences exist between the Tsonga and the patrilineal Sena/Ndau. In Ghana, Timæus and Reynar (1998) also found that polygyny was slightly higher among patrilineal populations than matrilineal ones. Also, in a multivariate analysis by Lesthaeghe et al. (1989:314), matrilinearity produced on average a 13-percentage-point diminution in polygyny when compared to patrilineal descent systems. These findings are consistent with the theoretical proposition that matrilineal systems are incompatible with polygynous household formation because of their tendency towards matrilocal or uxorilocal residence (Lesthaeghe et al. 1989:314).

Table 5.6 Regression coefficients and odds ratios of being in a polygynous marriage, Mozambique 1997 DHS

Socio-economic characteristics	Regression coefficients (β)	Odds ratios (e^{β})
Woman's education		
No education ®	0.000	1.000
Primary	-0.116	0.891
Secondary or higher	-0.882	0.414 **
Woman's occupation		
Not working	-0.422	0.656 ***
Agriculture®	0.000	1.000
White-collar	0.235	1.265
Other	-0.042	0.959
Husband's occupation		
Not working	-0.307	0.735
Agriculture®	0.000	1.000
White-collar	0.364	1.439 **
Other	0.113	1.120
Religion		
Catholic ®	0.000	1.000
Protestant	0.379	1.461 **
Muslim	0.334	1.396 **
Zionist	0.511	1.667 ***
Other religion	0.388	1.474 *
No religion	0.807	2.242 ***
Ethnicity		
Tsonga ®	0.000	1.000
Sena/Ndau	-0.044	0.957
Lomwe/Chuwabo	-1.305	0.271 ***
Macua	-0.912	0.402 ***
Other local	-0.752	0.471 **
Portuguese/foreigner	0.063	1.065
Place of residence		
Urban ®	0.000	1.000
Rural	0.560	1.751 ***
Age	0.037	1.037 **
Parity	-0.053	0.949 **
Duration of marriage		
0-4 ®	0.000	1.000
5-9	0.396	1.486 **
10-14	0.511	1.667 **
15-19	0.229	1.257
20+	0.034	1.034
Region		
Northern	0.047	1.048
Central	0.213	1.238 *
Southern®	0.000	1.000

Table 5.6 Continued ...

Constant	-2.7 ***
- 2 Log likelihood	5151.2
Chi-square	389.9 ***
No. of cases	4881

Notes: ® Reference category; *p≤0.05; **p≤0.01; ***p≤0.001.
Source: Computed from 1997 DHS.

Table 5.6 also shows that being of 'other' ethnic group depresses polygyny by about 53 per cent in relation to the Tsonga, while women in the Portuguese/foreigner category do not differ from the Tsonga. The diverse composition of these two categories makes it difficult to explain these effects. The 'other' category is a residual comprising both patrilineal and matrilineal ethnic groups. On the other hand, the Portuguese/foreigner category includes Mozambicans, Europeans and Asians.

The odds that a woman is in a polygynous marriage tend to first increase and then decrease with marital duration. Controlling for the other socio-economic characteristics, women married for at least five years are more likely to be in polygyny than women who are married for less than five years. In their analysis of sub-Saharan Africa, Timæus and Reynar (1998) found that the association between the prevalence of polygyny and marital duration was steeper in the most polygynous countries than in countries with less polygyny. Age at marriage, radio ownership (a proxy of household living standards) and husband's education had also been included in the model, but were later dropped for not having a significant effect on polygyny.

The odds that a marriage is polygynous are nearly twice as high in rural as in urban areas. Harsh living conditions such as housing problems, unemployment, and high cost of living in urban areas may not be conducive to plural marriage and large households (Klomegah 1997). Furthermore, more exposure to 'Western' influences in urban areas may weaken the extended family systems and encourage monogamous marriages (Timæus and Reynar 1998). In explaining the effect of urban residence on polygyny, Timæus and Reynar (1998) attempted to separate the economic and the cultural explanatory factors of the place of residence-polygyny relationship, but did not produce conclusive results, although they suggested that the association between polygyny and economic status may be stronger in rural than in urban areas.

The regional pattern of polygyny shown by the DHS data in the bivariate analysis (Table 5.5) remained unchanged even after other factors had been controlled for. Women in Central Region are 24 per cent more likely to be in polygynous marriages than those in Southern Region, while there is no significant difference between women in the Southern and Northern Regions in the odds of being polygynous.

5.5 Marital dissolution

Ethnographic research among the main ethnic groups suggests that the dissolution of marriage is common in Mozambique. The main reasons given for the dissolution of marriage include female infertility, male impotence, ill-treatment of women by men, refusal of sexual intercourse, and accusations of witchcraft and adultery (Amorim 1957; Brites 1960; Ferreira 1960; Magalhães 1960; Junod 1974; Martinez 1989; Pequenino 1995). Among the patrilineal ethnic groups, with a high prevalence of polygyny, the infertility of a woman is more likely to lead to polygyny than to divorce. Most of the respondents and discussants interviewed by the author in Southern Region revealed that the best solution for men with infertile first wives was to take another wife. Indeed, it is common for a husband of an infertile woman to marry one of her close relatives, usually her sister or cousin (see Rita-Ferreira 1968; Junod 1974), and this is more likely to happen when the wife's family is unable to repay the bridewealth (Rita-Ferreira 1968).

Marital dissolution may have a negative effect on women's fertility. According to Burch (1983:547) the dissolution of a union leads to periods of little or no sexual activity and therefore to a reduced risk of pregnancy. However, the effect may be minor where the frequency and speed of remarriage following a divorce is high, since the period from one marriage to another is short. Although the extent to which remarriage is prevalent in Mozambique cannot be determined owing to lack of data, reports on some sub-Saharan African countries suggest frequent and quick remarriage of women following a divorce (see Brandon 1990). In her study of three West African countries Brandon (1990:207) reported that the proportion of divorced women who eventually remarried ranged from 79.4 per cent in Ghana, to 81.7 per cent in Côte d'Ivoire and 85.0 per cent in Nigeria. Over 30 per cent of the divorced women who remarried had done so within one year after divorce.

In the subsection that follows, data from the 1997 Census and DHS are used to assess the levels and differentials of marital dissolution in Mozambique. Because neither data from registration systems nor from women's marriage histories are available, the analysis that follows is based on the reports of current marital status and the number of unions women had had at the time of the census or survey.

5.5.1 Levels and differentials of marital dissolution in Mozambique

Table 5.7 presents two measures of marital disruption derived from the 1997 Census and the 1997 DHS: the proportion currently divorced among ever married women aged 15-49 and the proportion of women who were in their second or higher order marriage at the time of the survey. Both measures should be interpreted with caution. The first, which represents the proportion of women who are currently divorced, is influenced by both marital dissolution and subsequent remarriage. Thus, given that remarriage usually takes place soon after divorce, the figures in Table 5.7 may be underestimated. Also, the proportion of women who have been married twice or more may overestimate the level of marital dissolution since two different factors could have caused multiple marriages: remarriage after divorce and remarriage after widowhood. Nevertheless, the figures in Table 5.7 appear consistent with one another and show higher marital instability in Northern Region than in Central and Southern Regions. The majority of Northern Region's population is of matrilineal descent and profess Islam, factors that are associated with high marital dissolution (Brandon 1990; Jones 1994). In contrast, the predominance of patrilineal descent and Christianity may partly be related to low marital dissolution in Central and Southern Regions.

Table 5.7 Measures of female marital dissolution by region, Mozambique 1950 and 1997

Region	% currently divorced 1997 Census	% married twice or more 1997 DHS
Northern	8.2	54.8
Central	6.6	20.3
Southern	7.8	17.5
Mozambique	7.4	30.1

Source: Computed from the respective data sets.

The effect of ethnicity, religion and other socio-economic factors on marital dissolution is investigated by multivariate analysis of the 1997 DHS data. The dependent variable is a dichotomous variable indicating whether or not a woman had been married more than once at the time of the survey. The independent variables are the same as in the analysis of age at marriage. Because having married more than once measures the frequency not only of divorce but also of widowhood, which is related to the level of mortality, the proportion of children ever born who have died is included in the model to allow for differential mortality. Ideally, data on adult mortality are needed to give an indication of the likelihood of widowhood. Since such data are not available, however, the proportion of children dead has been used as a mortality indicator, as there is normally a fairly close correlation between childhood mortality levels and adult mortality levels.

The net effects of socio-economic factors on marital dissolution are presented in Table 5.8. Woman's education does not have a significant effect on marital stability. Primary education increases the likelihood of marital dissolution by 16 per cent, whereas secondary education reduces it by 12 per cent in comparison with uneducated women, but in neither case is the effect significant. What has a significant effect is paid employment. The likelihood that a woman working for wages will experience a marital dissolution is 52 per cent higher than for a woman who is not working. This finding is consistent with studies in developed countries (see Booth et al. 1984; Hou and Omwanda 1997; Sayer and Bianchi 2000; South 2001). The positive effect of woman's paid employment on marital instability operates through increased financial independence or reduced dependence on the husband for financial support. By providing other options for financial support and alternative sources of emotional and other gratification to marriage and family, woman's employment may make women more likely to terminate unsatisfactory marriages and consider divorce as a viable and less painful option (Hou and Omwanda 1997:273).

Woman's unpaid work or self-employment does not have a significant effect on marital dissolution. This implies that, despite providing women with an independent source of income, self-employment does not increase women's financial independence or reduce their dependence on their husbands. Studies in the Southern Region cities of Maputo, Inhambane and Maxixe (Arnaldo 1996, 1999) found that the majority of self-employed women were engaged in unprofitable informal trading. Because such activities are financially unstable they do not provide enough income for women to consider divorce as a viable option.

Table 5.8 Odds ratios of women having been married more than once by socio-economic characteristics, Mozambique 1997 DHS

Socio-economic characteristics	Regression coefficients (β)	Odds ratios (e^{β})
Education		
No education ®	0.000	1.000
Primary	0.146	1.158
Secondary or higher	-0.138	0.871
Employment status		
Not working ®	0.000	1.000
Unpaid worker	0.126	1.135
Self-employed	-0.030	0.971
Paid worker	0.421	1.524 *
Religion		
Catholic ®	0.000	1.000
Protestant	0.357	1.429 **
Muslim	0.262	1.300 *
Zione	0.702	2.019 ***
Other religion	0.469	1.598 **
No religion	0.347	1.415 **
Ethnicity		
Tsonga ®	0.000	1.000
Sena/Ndau	-0.010	0.990
Lomwe/Chuwabo	0.467	1.595
Macua	0.538	1.713 *
Other local	-0.252	0.777
Portuguese/foreigner	0.250	1.284
Place of residence		
Urban ®	0.000	1.000
Rural	-0.186	0.830
Household owns radio		
Yes ®	0.000	1.000
No	-0.180	0.836 *
Age	0.058	1.060 ***
Number of children ever born		
None ®	0.000	1.000
1 – 2	0.085	1.089
3 or more	-0.173	0.841
Age at marriage		
< 15 ®	0.000	1.000
15 –17	-0.174	0.840 *
18 –19	-0.502	0.605 ***
20 +	-0.558	0.573 ***
Type of marriage		
Monogamous ®	0.000	1.000
Senior wife	-0.312	0.732 **
Junior wife	1.362	3.904 ***

Table 5.8 Continued …

Proportion children dead	0.853	2.346 ***
Region		
Northern	1.203	3.329 ***
Central	0.186	1.205
Southern ®	0.000	1.000
Constant		-3.6 ***
- 2 Log likelihood		5184.7
Chi-square		989.9 ***
No. of cases		5096

Notes: ® Reference category; *p≤0.05; **p≤0.01; ***p≤0.001.
Source: Computed from 1997 DHS.

The relationship between woman's religion and the odds of being married more than once broadly follows the expected pattern. Women who profess a religion other than Catholicism are more likely than Catholics to have married more than once. This higher stability of Catholic marriage may be attributed to the strong anti-divorce position of the Catholic Church (Lesthaeghe 1989; Lehrer and Chiswick 1993). Among the other religions, Zionist women have the highest odds (twice as likely as Catholics) of having been married twice or more. This finding is surprising, especially because the *Zione* Church cannot be considered more tolerant of divorce than Islam, where divorce is permitted (see Mondal 1997:418). An alternative explanation for the high likelihood of Zionist women to have been married more than once may be related to the attractiveness that this religion may have for divorced infertile women. Since the *Zione* Church is a healing religion, many divorced infertile women may be attracted to join it in search of a cure for their infertility. This is mainly driven by the social stigma against infertile women (see Chapter 7).

Differentials by ethnicity in the odds that a woman is married twice or more show a matrilineal-patrilineal dichotomy. Matrilineal ethnic groups (Lomwe/Chuwabo and Macua) have a higher likelihood of experiencing marital dissolution than patrilineal ethnic groups (Tsonga and Sena/Ndau). But the odds ratio for the Lomwe/Chuwabo is not statistically significant at the 5 per cent level, a fact probably related to the small number of women in the category. These differentials may partly be related to the marriage system. Among the Sena/Ndau and Tsonga, marriage involves the transfer of the woman's productive and reproductive power to her husband's family through the payment of bridewealth and the children resulting from the union belong to the husband's lineage. Thus, since divorce implies the return of the bridewealth and separation of the mother from her children, a woman in a patrilineal society may be more hesitant to leave an unsatisfactory marriage than one in a matrilineal society. In contrast, in Macua and Lomwe/Chuwabo marriage, there is no transfer of women's productive and reproductive abilities and the children belong to the woman's lineage so that divorce is easy and does not involve any kind of wealth transfer, since bridewealth payment is not required. The high instability of Macua marriage has been reported in several ethnographic studies (e.g. Conceição 1960; Lopes 1960; Martinez 1989). According to Conceição (1960), the smallest quarrel is enough reason for a Macua man or woman to divorce his or her partner. For instance, 'being tired' is a plausible reason to dissolve a Macua marriage (Lopes 1960).

Place of residence does not appear to affect marital instability in Mozambique. Although women living in rural areas are 17 per cent less likely to have been married more than once than women living in urban areas, this difference is not statistically significant. This finding seems consistent with the study by Brandon (1990:Chapter 3) on Ghana, Nigeria and Côte d'Ivoire, which found that there was only a small positive effect of urban residence on divorce, especially within the first ten years of marriage.

Infertility has no effect on marital instability. Table 5.8 does not show a significant difference in the odds ratios of having had multiple marriages between women who are childless and those who are not. The absence of a significant effect of this variable on marital dissolution is rather surprising, but it may partly be explained by the fact that the problem of childlessness can be solved by resort to polygyny, especially among the patrilineal ethnic groups. On the other hand, this finding may reflect the 'grossness' of the dependent variable used in the analysis. Some studies that used women's marriage histories in the analysis of divorce in sub-Saharan Africa (e.g. Brandon 1990; Tilson and Larsen 2000) found a positive effect of infertility on divorce. For instance, Tilson and Larsen (2000:361) found that in Ethiopia 95 per cent of women who did not have a child in their first marriage divorced within 20 years and 85 per cent of these women had done so within the first five years of marriage.

Age at marriage is negatively related to marital instability. As shown in Table 5.8 women who married between 15 and 17, 18 and 19 or after their twentieth birthday are respectively 16, 39 and 43 per cent less likely to have been married more than once compared with women who married before the age of 15. This is consistent with findings elsewhere in both developed countries (Booth and Edwards 1985; Kiernan 1986; Carmichael, Webster and McDonald 1997) and developing countries (Brandon 1990; Jones 1994; Tilson and

Larsen 2000). Tilson and Larson (2000) found that in Ethiopia the age at marriage was an important factor in the risk of divorce. According to these authors early age at marriage increased the risk of divorce because of immaturity, homesickness, and women's lack of choice in whom they marry (Tilson and Larsen 2000:387).

Another factor with a strong effect on marital instability is polygyny. The results in Table 5.8 show that being senior wife of a polygynist reduces marital dissolution by 26 per cent, whereas being a junior wife multiplies by four likelihood of having been married more than once, compared with being a monogamous wife. This high odds ratio for junior wives indicates both the higher propensity for divorce compared with senior wives, and the higher probability that a divorced woman will remarry a polygynist rather than an unmarried man. This is strengthened by the practice of levirate, especially among the patrilineal ethnic groups (see Junod 1974).

The proportion of children ever born that have died has a very strong positive effect on the likelihood that a woman has had multiple marriages. This implies that some marriages were dissolved by death of the husband or the children. This is because in Mozambique, and in general in sub-Saharan Africa (see Caldwell and Caldwell 1990b), women whose children die, especially in infancy, are usually accused of witchcraft and are more likely to divorce.

The socio-economic controls that were introduced did not eliminate regional differences in marital instability. Marriage is more than three times as unstable in Northern Region and 20 per cent in Central Region than in Southern Region, but only the odds ratio for Northern Region is statistically significant. Northern Region is characterised by factors that are related to high marital dissolution: matrilinearity, early marriage and high infertility. But since the difference remains even after these factors are controlled, other factors may also be important.

5.6 Conclusion

This chapter examined nuptiality patterns in Mozambique focusing on three aspects: age at marriage and the proportion marrying; polygyny; and marital dissolution. Regarding age at marriage and the proportion marrying, the analysis indicates that Mozambique still has early marriage (SMAM=18 years in 1997) and almost universal marriage (only 6% of women 45-

49 have never been married); only a small change occurred between 1980 and 1997. Such a pattern is very different from that of some neighbouring countries such as South Africa, Botswana and Namibia (Botswana Central Statistics Office 1989; United Nations 1990; Katjiuanjo et al. 1993; Pitso 1997), where marriage is late and not universal, but it is similar to countries like Malawi, Tanzania, Zambia and Zimbabwe, although in some of these countries age at marriage has been increasing (see Hinde and Mturi 2000, for Tanzania).

The marriage pattern in Mozambique differs according to region. In Northern Region the age at marriage is very early (SMAM<17 years in 1997), polygyny is less prevalent and marriage is very unstable; in Central Region, women also marry early (SMAM between 17 and 18 years), but later than in Northern, the prevalence of polygyny is very high and marriage is more stable than in Northern Region; and in Southern Region, women marry later (SMAM >19 years), and polygyny and marital instability are less than in either Central or Northern Region. Between 1980 and 1997, only Southern Region experienced a significant increase in age at marriage, owing to more socio-economic development, exemplified by higher levels of women's education and work outside the home, than in Northern and Central Regions.

Multivariate analysis of the effect of socio-economic factors on age at marriage, being polygynous and having been married more than once, highlights the importance of both modernisation (socio-economic development) and cultural factors in determining the marriage pattern in Mozambique. Education, paid employment, urban residence and patrilinearity were all associated with late marriage, but religion did not have any effect on age at marriage. While the effect of modernisation variables on age at marriage was in the expected direction, that of ethnicity is surprising and is in contrast with the expectation that matrilinearity is conducive to late marriage (McDonald 1985; Lesthaeghe et al. 1989; Kaufman and Meekers 1998). Women of the matrilineal Macua and Lomwe/Chuwabo ethnic groups marry earlier than the patrilineal Tsonga and Sena/Ndau women. Since both the 1997 Census and DHS produced similar results and they cannot be attributed to dubious data quality, this difference is genuine. The fact that the findings in this study contradict the existing literature on sub-Saharan Africa may suggest that the effect of matrilinearity and patrilinearity descent on age at marriage may be context-specific. Therefore, generalisations in a region as diverse as sub-Saharan Africa should be made with caution.

In relation to polygyny and marital dissolution, both modernisation and cultural factors broadly support earlier research in the region. Modernisation (as measured by high education, urban residence and wage employment) and matrilineal descent are associated with low odds of being polygynous and high marital instability. Contrary to some studies in sub-Saharan Africa (Brandon 1990; Tilson and Larsen 2000), infertility (as measured by childlessness) appears to have no effect on marital dissolution. This finding, however, may be misleading since the dependent variable used in this analysis, having been married more than once, is not a good measure of divorce or separation. Also, the absence of a significant effect of childlessness on marital dissolution may be related to the fact that men, especially those of patrilineal descent, can opt to take another wife rather than divorcing a sterile first wife.

Chapter 6

POSTPARTUM INFECUNDABILITY

6.1 Introduction

Following a childbirth, each woman experiences a period of temporary infecundability, usually referred to as the postpartum non-susceptible period, during which she does not ovulate (Page, Lesthaeghe and Shah 1982; Bongaarts and Potter 1983; Gaisie 1984). Although anovulation would be the best measure of the non-susceptible period, it is difficult to observe and relevant data cannot be collected adequately through surveys (Page et al. 1982:8; Gaisie 1984). Thus, instead of anovulation, postpartum amenorrhoea is often used as a proxy measure of the postpartum non-susceptible period. The length of both the amenorrhoeic and anovulatory periods is determined mainly by the duration, frequency and intensity of breastfeeding. In the absence of breastfeeding, postpartum amenorrhoea commonly lasts about two months, but it can last between one and two years where breastfeeding is prolonged and intensive (Page et al. 1982:8; Bongaarts 1983). The explanation behind the relationship between breastfeeding and anovulation lies in the endocrine factors that are associated with lactation (Page et al. 1982; McNeilley 1993). Breastfeeding stimulates the production of serum prolactin which not only maintains milk production but also is associated with an inhibiting effect on hormones that regulate ovulation and the menstrual cycle (Page et al. 1982).

Apart from breastfeeding itself, women in sub-Saharan Africa usually observe a period of postpartum sexual abstinence sometimes longer than the anovulatory period (Caldwell and Caldwell 1977, 1981; Lesthaeghe et al. 1981; P. Caldwell and J. Caldwell 1981; Gaisie 1981, 1984; Trussell et al. 1992), which, coupled with long breastfeeding, is an important fertility-inhibiting factor in the region (Goldman, Westoff and Paul 1987; Jolly and Gribble 1993).

This chapter examines the differentials in the postpartum infecundability variables, breastfeeding, postpartum amenorrhoea and sexual abstinence, in Mozambique. The effect of postpartum infecundability on fertility is dealt with in Chapter 9. This chapter is organised as follows. In Section 6.2 is a description of the socio-cultural context that motivates the practice of postpartum sexual abstinence among the Tsonga and other ethnic groups in Mozambique. Understanding the reasons behind its practice may help in explaining differentials in the abstinence period between groups. Section 6.3 discusses the socio-economic differentials of postpartum amenorrhoea, breastfeeding and abstinence at a bivariate level. Section 6.4 applies multivariate techniques to determine the net effect of women's socio-economic characteristics on the duration of postpartum infecundability variables. Section 6.5 summarises the findings.

6.2 Rationale of abstinence practice in Mozambique: an emphasis on the Tsonga

Among the three postpartum variables, postpartum sexual abstinence is probably the most subject to cultural influence. This section provides a brief description of the rationale for its practice among the Tsonga, from whom fieldwork data (2001 Inhambane Qualitative Survey) were collected. Where possible, information on other ethnic groups from secondary sources is given in order to establish a cultural background for the interpretation of the results in the succeeding sections.

Sexual abstinence during the breastfeeding period practised by the Tsonga is not for family limitation purposes, but to protect the health of the child[11]. The Tsonga believe that breast-milk can be contaminated by a man's semen if a nursing woman engages in sexual intercourse, and that a child who suckles such poisoned milk will become sick or even die. This belief has also been reported for the Macua (Martinez 1989) and the Lomwe (Pequenino 1995) of Northern and Central Regions respectively, and for other ethnic groups elsewhere in sub-Saharan Africa such as the Yoruba of Nigeria (Caldwell and Caldwell 1977; Orubuloye 1981; Adeokun 1983) and the Lomwes/Yaos, Ngonis/Chewas and Tumbukas of Malawi (Zulu 2001).

However, man's semen is not the only harmful thing for the child. A child's contact with a person who has just had sexual intercourse is also considered harmful. It is believed that sexual intercourse makes a person 'hot' (*Ku hisa*) and hence harmful for a suckling child. For instance, although among the Tsonga sexual abstinence is mainly proscribed for the

[11] This has also been reported for other parts of sub-Saharan Africa (e.g. Saucier 1972; Caldwell and Caldwell 1977, 1981; Orubuloye 1981; P. Caldwell and J. Caldwell 1981; Schoenmaeckers et al. 1981; Adeokun 1983; Benefo, Tsui and Johnson 1994; Zulu 2001).

nursing mother; the father of the child must not touch the child while 'hot', that is, after having had sexual intercourse with another woman. The child would be 'afraid' of his 'hotness' and get sick or even die. To avoid 'burning the child' when 'hot', the father should perform a 'cooling down' ritual. This consists of taking and stretching the child while saying 'Don't be afraid of me, I am hot', and then passing the child to the mother who should also stretch the child and drop some breastmilk on its back. According to some respondents, this practice is very effective but it instigates instability in the marriage since it makes the wife aware of her husband's extramarital affairs. Thus, some men opt for coming home very late when their wives are already sleeping and staying away from the child until the next day when they have 'cooled down'.

The prohibition of child contact with a 'hot' person applies not only to the father but also to any person who might come into contact with the child. According to Junod (1974:51-52), all people who were married, that is who were potentially having regular sexual relations, were barred from the hut where the woman and her newborn baby stayed in the first days or weeks after delivery. Since they were potentially 'hot', if they went into the hut and touched the child it could die. If a married or sexually active woman needed to see the newborn infant, she would have to abstain from sexual relations for at least two days before she could touch the baby. In contrast, young unmarried and sexually inactive girls are always welcome to see and hold the new baby, because they are not 'hot' and cause no danger to the child. Martinez (1989) reported that among the Macua, sexual abstinence after birth was also prescribed for all women who had assisted the delivery. These women abstained from sexual intercourse until the ceremony of *fogo já apagado* ('fire already extinguished') which takes place when the baby's navel heals (Martinez 1989:102).

Among the Tsonga, the end of the postpartum abstinence period is marked by a ritual sexual intercourse. It is believed that if the mother resumes sexual relations without performing the ritual the child will get sick and eventually die. This ritual is called *ku boha/tiyisa dzowu* (to tie/strengthen the *dzowu*- a piece of cloth used to carry the child, sling), *ku tiyisa nwana* (to strengthen the child) or *ku amukela nwana* (to receive the child), and is aimed at strengthening the child and protecting it from becoming sick or dying through contact with the sweat and vapours that the parents produce when they have sexual intercourse. It also symbolises the official reception of the newborn by the family and the community (see also Junod 1974:65). This ritual can take different forms. The following passage from a male focus group discussion illustrates one way it is performed:

> When the time has arrived the couple (parents of the child) spread the child's *dzowu* on the bed and put on top of it the child's clothes and a thread with a knot tied in its middle. Then they lay the child on these clothes and *dzowu*, between the wife and the husband more to the top of the bed. The child should remain lying on this side while the parents have sex. Then, both parents, and at the same time, hold and lift the child together with its clothes and *dzowu* and tie the thread around its waist. On the following day they do nothing, but on the next day [two days after], they repeat the same procedure to strengthen the thread they tied two days earlier. After this they can have sexual intercourse and the child will not get sick (Adult men's FGD, Inhambane 2001).

This ritual, which takes place one year or later after birth among the Tsonga, can also be performed by the child's paternal grandparents. This occurs when the father of the child is away and the husband's parents suspect their daughter-in-law could engage in extramarital sexual intercourse and put the life of the newborn in danger.

Ethnographic studies have reported similar rituals among other ethnic groups in Mozambique, such as the Lomwe's *Omwakulela Mwana* (Pequenino 1995) and the Sena's *Cerimónia do fio da rafia* (Brites 1960; Ivens-Ferraz de Freitas 1971) but they seem to be performed differently. For the Lomwe the ritual is oriented by a traditional healer and takes place between four months and one year after birth (Pequenino 1995), whereas for the Sena it is performed after the healing of the child's navel (Magalhães 1960; Ivens-Ferraz de Freitas 1971).

Although the ritual can take different forms and be performed at different periods after birth, the underlying point is that the child would get sick if the parents had sexual relations before performing the child-strengthening or child-reception ritual. However, there are differences with regard to whose abstinence is required, that of both parents or only that of the mother. While among the Lomwe neither the man nor the woman should have sexual intercourse with each other or with another person before the ritual, among the Tsonga the abstinence is mainly restricted to the woman. The man can have sexual intercourse with anther woman as long as he does not touch the child while he is 'hot' or without performing the 'cooling down' ritual described above.

6.3 Socio-economic differentials

6.3.1 The data and measures

The 1997 MDHS collected data on breastfeeding, amenorrhoea and postpartum sexual abstinence relating to the two most recent births that occurred in the three years preceding the survey. Two approaches can be used in analysing these data, each of which has advantages and disadvantages. One approach is to restrict the analysis to the last closed birth interval, that is, between the last two births to a woman. Although the analysis of these purely retrospectively reported data is straightforward, it may be biased through reporting errors, selectivity and censoring (Bracher and Santow 1981; Page 1981; Page et al. 1982). Retrospective data on duration of breastfeeding, postpartum amenorrhoea and sexual abstinence are often affected by recall problems that lead to heaping at multiples of six months (Bracher and Santow 1981; Page 1981; Shah 1984). Although such heaping may in part be genuine, reflecting norms about appropriate times for weaning and resumption of sexual relations, it is in part questionable because a similar pattern of heaping also tends to be observed in the retrospective reporting of the duration of amenorrhoea, which is less likely to be real because the resumption of menses is not under the voluntary control of the woman (Trussell et al. 1992:290). Furthermore, restriction to the last closed interval leads to an over-representation of short intervals, since women who have long birth intervals are less likely to have reached their second birth (to have a closed birth interval) than women with short intervals, leading to a downwards bias in the estimates (Page 1981; Shah 1984).

The second approach is to use current-status information on whether the woman is still breastfeeding, whether she is still amenorrhoeic and whether she is still abstaining at the time of the interview, and to restrict the analysis to births occurring during a specific period immediately preceding the survey (Page et al. 1982). The advantage of this approach is that this information is less subject to misreporting, since all that is required is the age of the child and whether or not the woman is still amenorrhoeic, breastfeeding or abstaining since the birth in question (Lesthaeghe and Page 1980; John, Menken and Trussell 1988:116).

However, current-status data are subject to large sampling variability, because of small numbers that result from the division of the sample by age of the child; the only cases that contribute to the estimation of the proportion still amenorrhoeic, breastfeeding or abstaining at age *a* are children born *a* years before the survey (John et al. 1988; Trussell et al. 1992). Simulation models by Bracher and Santow (1981:430) suggested that current-status data are also subject to 'a strong bias caused by the dependence of the length of the closed birth interval on the duration of abstinence', which tends to underestimate the proportions of women amenorrhoeic, breastfeeding or abstaining for durations less than the mean and overestimates the proportions for durations greater than the mean, but John et al. (1988) considered such analysis incomplete and dependent on the particular construction of the simulation models.

Despite these biases, current-status measures can provide good estimates of the survival function for a sample of births that occur during a fixed period (Page et al. 1982; Trussell et al. 1992). It is important, however, that an appropriate reference period is set in order to avoid bias associated with the restriction of the analysis to a section of the data. For example, a period of one to two years may be insufficient to provide good estimates in populations where a significant proportion of women breastfeed or abstain for more than two years. But going further back in time may also produce biased estimates because women with short birth intervals would be under-represented, since they are more likely to have had more than two births during the period under consideration (Page et al. 1982:16). Thus, the most convenient reference period should be defined as equal to or longer than the longest duration of breastfeeding in the population being studied (Page et al. 1982).

Given that a long breastfeeding period is a characteristic of the Mozambican population, the estimates discussed in the following section were obtained by considering the information collected by the 1997 DHS relating to the three years preceding the survey. Life table techniques were used to estimate the proportions of women still breastfeeding, still amenorrhoeic and still abstaining per single month elapsed since the birth of the child. These proportions were taken as estimates of the life table survivorship function (l_x) and used in the estimation of mean durations of postpartum infecundability variables, following Page et al. (1982).

According to Page et al. (1982:25-29) if children recorded as born *d* months before the survey were, on average, born exactly *d* months ago, the proportion currently being breastfed (or whose mothers are still amenorrhoeic or abstaining) among those recorded as born *d* months ago, *P(d)*, can be taken as an estimate of l_x $(x=d)$ for that cohort of children. Then, the mean duration can be calculated from the sequence of *P(d)* values using the equation:

$$\overline{Y} = 0.5E + \sum_{d=1} P(d)$$

where $\overline{Y}$ = mean duration of breastfeeding, amenorrhoea or abstinence;

E= Proportion ever breastfed, amenorrhoeic or abstained;

$P(d)$= Proportion still breastfeeding, amenorrhoeic or abstaining after d months.

However, the series of *P(d)* values does not necessarily form a monotonically declining sequence. The *P(d)* survival function is usually irregular mainly due to sampling variability related to the fragmentation of the sample into small subsamples of children of specific age, and some form of smoothing is necessary to reduce the irregularities before calculating the mean. For this study, where the survival function was not monotonic the pool-adjacent-violators algorithm was used to smooth the distribution (Trussell et al. 1992). The procedure involves moving along the survival curve until the next value that is higher than the preceding values, and then backtracking over as many values as necessary for their average to exceed or equal the proportion surviving at the point where the monotonicity requirement initially failed (Trussell et al. 1992:292).

The mean duration of the postpartum variables was also computed using the 'Prevalence/Incidence' method (Mosley, Werner and Becker 1982:5-7; Gaisie 1984:21). The 'Prevalence/Incidence' (*P/I*) method, which assumes a constant flow of births in the recent past, involves comparing the prevalence of a phenomenon (*P*) with its incidence (*I*). In this case, the prevalence (*P*) represents the number of births for which the mother is still in the postpartum condition (that is, she is still breastfeeding, still amenorrhoeic, or still abstaining from sexual intercourse) irrespective of when those births occurred, and the incidence (*I*) represents the average number of births per month (Gaisie 1984). Unlike the life table technique, this procedure requires no information on dates at all, and is particularly useful for analysis of subgroups for which sample sizes are small (Page et al. 1982; Gaisie 1984:21).

The following section presents and discusses the results obtained through the application of these methods.

6.3.2 Socio-economic differentials

Tables 6.1, 6.2 and 6.3 present the measures of breastfeeding, amenorrhoea and abstinence durations, respectively, estimated following the methods described in the preceding section: the mean; the quartiles Q_1, Q_2 (median) and Q_3, or the durations (in months) at which 25, 50, and 75 per cent of women in the sample were no longer breastfeeding, amenorrhoeic or abstaining; the trimean $[(Q_1+2Q_2+Q_3)/4]$; and the percentage ever breastfed (S(0)).

Breastfeeding

The data in Table 6.1 show that in Mozambique breastfeeding is both universal and of long duration. Over 98 per cent of the children born during the three years preceding the survey were breastfed by their mothers. The mean *(P/I)* duration of breastfeeding is 24.8 months and the median duration 24.5 months. Comparison of the mean durations of breastfeeding by cohort of women shows that the difference between the cohorts is small, 2.1 months or less, implying that the pattern of breastfeeding has remained stable over time. Woman's education, urban residence, ethnicity and region are related to the duration of breastfeeding. Women with secondary education breastfeed (on average) for between 4 and 5 months less than women with primary education, and for between 7 and 9 months less than women with no education. Urban residence reduces the duration of breastfeeding by 4-5 months on average. This relationship may reflect both the greater availability of breastmilk substitutes in urban than in rural areas and their convenience for wage-earner mothers, who, according to the 1997 census, are more likely to be educated and live in urban areas.

Only women who profess the Protestant religion show a slightly shorter duration of breastfeeding than women of other religious groups. It is not clear why Protestants breastfeed about two months less (on average) than other groups, especially since the 1997 Census shows that they are educated and urbanised similarly to the Catholics and the Zionists. Regarding ethnicity, the differences in the duration of breastfeeding are even smaller, reflecting a commonality of cultural practice of prolonged breastfeeding among all ethnic groups. However, women of Portuguese/foreigner background, followed by the Tsonga, have slightly shorter durations of breastfeeding. The high socio-economic status enjoyed by women of these ethnic backgrounds may partly be responsible for the differences (see Chapter 1). It is important to note that, with the exception of the Portuguese/foreigner group (with mean duration of breastfeeding of 19 months), no ethnic group breastfeeds for less than 22.9 months on average. This seems consistent with the findings from the author's fieldwork and also from the ethnographic studies about several cultural groups, which suggest an ideal duration of breastfeeding that ranges from one-and-a-half years to three years (see Brites 1960; Junod 1974:54; Martinez 1989).

Table 6.1 Months of breastfeeding following a live birth estimated from births in the three years preceding the survey by selected socio-economic characteristics, Mozambique 1997 DHS

Socio-economic characteristic	Quartiles				Mean		% ever breastfed
	Q_1	Q_2	Q_3	Trimean[a]	(LT)[b]	(P/I)[c]	S(0)
Age							
15-24	18.5	24.5	A	NA	24.5	24.8	98.5
25-34	18.5	24.3	A	NA	23.6	24.9	99.0
35-49	20.2	24.8	A	NA	25.7	24.4	99.1
Education							
No education	20.7	26.3	A	NA	26.6	25.9	99.3
Primary	18.4	24.3	A	NA	23.3	24.2	98.6
Secondary or higher	14.8	20.0	24.4	19.8	18.9	17.1	97.2
Place of residence							
Urban	18.0	21.4	28.4	22.3	21.6	20.6	98.6
Rural	19.0	24.8	A	NA	25.4	25.9	98.9
Religion							
Catholic	18.7	24.7	A	NA	24.9	25.8	98.1
Protestant	18.2	21.8	26.3	22.0	21.4	23.7	99.3
Muslim	21.0	A	A	NA	27.4	24.8	98.7
Zionist	18.8	24.4	30.6	24.5	23.5	22.8	99.5
Other religion	18.9	24.4	A	NA	23.9	24.0	99.0
No religion	18.5	24.5	A	NA	24.4	25.4	99.1
Ethnicity							
Tsonga	18.6	24.2	27.8	23.7	22.9	23.7	99.3
Sena/Ndau	18.8	24.6	A	NA	24.6	25.6	99.1
Lomwe/Chuwabo	14.4	24.7	A	NA	24.3	25.3	96.7
Macua	19.5	A	A	NA	27.2	25.3	98.1
Other local	18.5	24.9	A	NA	25.1	25.7	99.2
Portuguese/foreigner	12.8	18.5	25.0	18.7	18.5	19.0	96.1
Region							
Northern	19.5	A	A	NA	27.8	25.8	98.5
Central	18.5	24.5	A	NA	24.1	25.2	98.9
Southern	18.4	24.2	27.0	23.4	22.4	23.2	99.1
Mozambique	18.6	24.5	A	NA	24.4	24.8	98.8

Notes: Q_1, Q_2, Q_3 are the durations (in months) at which 25 per cent, 50 per cent (median), and 75 per cent of women are no longer breastfeeding; [a] Trimean = $(Q_1+2Q_2+Q_3)/4$; [b] Estimated mean duration using life table technique; [c] Estimated mean duration using Prevalence-Incidence method; A indicates that the proportion still breastfeeding after three years is higher than the proportion corresponding to the quartile; NA not applicable.
Source: Computed from 1997 DHS.

Postpartum amenorrhoea

Measures of postpartum amenorrhoea presented in Table 6.2 show that on average women in Mozambique are amenorrhoeic following a live birth for a period of between 15.8 and 17 months. The pattern of socio-economic differentials is similar to that of breastfeeding, which is not surprising since the duration of amenorrhoea is largely determined by the duration, frequency and intensity of breastfeeding. Consistent with the breastfeeding analysis, the cohort differences are minimal. However, educational and urban-rural differences are much larger for amenorrhoea than for breastfeeding. The mean duration of postpartum amenorrhoea for women with secondary education is between 7.3 and 7.9 months compared with 14.7 to 15.5 months for those with primary education and 18.5 to 18.9 months for uneducated women, whereas the duration for urban women is 11.8 months compared with 17.5 months for women in rural areas. This implies that there are educational and urban-rural differences in the intensity and frequency of breastfeeding. More educated women and those living in urban areas have more access to breastmilk substitutes and are more likely to work outside the home, factors which are associated with low intensity and frequency of breastfeeding (Nag 1983). In contrast to breastfeeding, Protestants exhibit a similar duration of amenorrhoea to that of the other religions, but they are still the religious group with the shortest duration.

In relation to ethnicity, only women of Portuguese/foreigner background show a substantial difference from the women of the other groups. The mean duration of postpartum amenorrhoea for the former is between 7.4 and 8.0 months compared with 13.9 or longer for the latter. The duration at which 25 per cent of women of Portuguese/foreigner background are no longer amenorrhoeic is 3.2 months, compared with 5.4 months for Lomwe/Chuwabo and 6.8 months or longer for the remaining ethnic groups. This may reflect high socio-economic status and elements of modernity to which the Portuguese/foreigner women are more exposed in comparison with women of other ethnic backgrounds. However, socio-economic status cannot explain why the Lomwe/Chuwabo have the second shortest duration since they are one of the most disadvantaged groups.

Table 6.2 Months of postpartum amenorrhoea following a live birth estimated from births in the three years preceding the survey by selected socio-economic characteristics, Mozambique 1997 DHS

Socio-economic Characteristics	Quartiles Q_1	Q_2	Q_3	Trimean[a]	Mean (LT)[b]	(P/I)[c]
Age						
15-24	6.5	12.3	24.4	13.9	15.1	15.9
25-34	7.6	12.8	24.9	14.5	16.3	16.6
35-49	8.7	12.9	24.6	14.8	16.5	16.9
Education						
No education	9.3	14.1	A	NA	18.5	18.9
Primary	6.7	12.4	23.2	13.7	14.7	15.5
Secondary or higher	3.2	6.7	12.7	7.3	7.9	7.3
Place of residence						
Urban	4.4	10.8	18.5	11.2	11.9	11.8
Rural	8.6	12.9	A	NA	17.2	17.5
Religion						
Catholic	6.6	12.5	A	NA	16.2	17.6
Protestant	7.3	12.6	24.1	14.1	14.9	14.9
Muslim	7.7	12.5	27.7	15.1	16.1	17.5
Zionist	6.9	12.6	24.1	14.1	15.3	16.6
Other religion	6.3	12.3	20.5	12.8	13.5	15.8
No religion	8.5	14.0	A	NA	17.5	17.8
Ethnicity						
Tsonga	7.0	12.7	24.1	14.1	15.3	15.8
Sena/Ndau	7.7	12.7	24.3	14.4	15.6	16.8
Lomwe/Chuwabo	5.4	10.2	A	NA	14.6	13.9
Macua	8.2	12.7	A	NA	18.0	18.3
Other local	6.8	13.7	A	NA	18.2	17.7
Portuguese/foreigner	3.2	6.6	12.3	7.2	8.0	7.4
Region						
Northern	8.3	12.7	A	NA	17.6	18.0
Central	6.9	12.7	24.5	14.2	15.8	17.9
Southern	6.5	12.5	21.6	13.3	14.6	15.7
Mozambique	7.0	12.6	24.6	14.2	15.8	17.0

Notes: Q_1, Q_2, Q_3 are the durations (in months) at which 25 per cent, 50 per cent (median), and 75 per cent of women are no longer amenorrhoeic; [a] Trimean = $(Q_1+2Q_2+Q_3)/4$; [b] Estimated mean duration using life table technique; [c] Estimated mean duration using Prevalence-Incidence method; A indicates that the proportion still amenorrhoeic after three years is higher than the proportion corresponding to the quartile; NA not applicable.
Source: Computed from 1997 DHS.

Postpartum abstinence

The results in Table 6.3 show that sexual abstinence for nursing mothers is a common practice in Mozambique. On average, women abstain for between 15 and 17 months, with a median of 12.5 months. There is no indication of a decline in postpartum sexual abstinence taboo, since the differences in mean durations of abstinence between different cohorts of women are minimal. However, the results throw light on the relationship between postpartum abstinence practice and women's socio-economic characteristics.

There is an inverse relationship between the duration of postpartum abstinence and woman's education. Education facilitates the breakdown of traditional practices by exposing women to modernisation factors and increasing the use of modern contraception. Caldwell and Caldwell (1981), in their study of the Yoruba of Nigeria, suggested that a reduction of the postpartum sexual abstinence period could be expected as greater proportions of the population become more educated and live in urban areas. Consistent with this proposition, the mean duration of sexual abstinence in Mozambique ranges from 9.3 months for women with secondary or higher education to 19.1 months for women with no education. Thus, uneducated women abstain from sexual relations after birth for twice as long as women with secondary or higher education. The difference in the duration of sexual abstinence between women with primary education and those with no schooling is only 3 months. It can be seen from Table 6.3 that women in urban areas resume sexual relations after a birth two months earlier than those in rural areas, probably reflecting the fact that the former are away from the traditional family setting where deviations from long abstinence period norms are condemned (Caldwell and Caldwell 1981; Feyisetan 1990).

Table 6.3 Months of postpartum abstinence following a live birth estimated from births in the three years preceding the survey by selected socio-economic characteristics, Mozambique 1997 DHS

Socio-economic	Quartiles				Mean	
Characteristic	Q_1	Q_2	Q_3	Trimean[a]	(LT)[b]	(P/I)[c]
Age						
15-24	6.9	12.6	27.6	14.9	17.6	15.6
25-34	6.4	12.1	A	NA	15.5	14.9
35-49	7.0	13.0	A	NA	18.2	16.0
Education						
No education	7.3	13.7	A	NA	19.1	17.5
Primary	6.7	12.2	A	NA	16.0	14.6
Secondary or higher	4.6	6.8	11.4	7.4	9.4	9.3
Place of residence						
Urban	6.4	12.1	24.8	13.9	15.3	13.8
Rural	6.9	12.6	A	NA	17.4	15.8
Religion						
Catholic	6.1	11.8	A	NA	15.9	16.3
Protestant	6.6	12.4	A	NA	16.1	13.0
Muslim	8.4	12.8	A	NA	18.3	18.0
Zionist	8.2	12.8	A	NA	17.6	17.3
Other religion	6.2	10.6	24.1	12.9	14.4	12.6
No religion	6.9	12.8	A	NA	18.3	19.4
Ethnicity						
Tsonga	7.4	12.8	A	NA	18.2	17.2
Sena/Ndau	6.7	12.0	24.6	13.8	15.3	14.5
Lomwe/Chuwabo	2.4	3.4	5.8	3.8	6.6	7.2
Macua	9.4	18.0	A	NA	20.2	18.4
Other local	3.9	7.4	26.4	11.3	13.2	11.9
Portuguese/foreigner	4.7	8.1	13.0	8.5	12.4	9.0
Region						
Northern	9.8	15.2	A	NA	20.0	18.8
Central	5.1	10.0	24.5	12.4	14.2	13.6
Southern	7.0	12.6	A	NA	17.5	17.3
Mozambique	6.7	12.5	A	NA	16.9	15.9

Notes: Q_1, Q_2, Q_3 are the durations (in months) at which 25 per cent, 50 per cent (median), and 75 per cent of women are no longer abstaining; [a] Trimean = $(Q_1+2Q_2+Q_3)/4$; [b] Estimated mean duration using life table technique; [c] Estimated mean duration using Prevalence-Incidence method; A indicates that the proportion still abstaining after three years is higher than the proportion corresponding to the quartile; NA not applicable.
Source: Computed from 1997 DHS.

There is a very little variation according to religion. In contrast, the abstinence period varies considerably according to ethnicity, implying that specific norms about its practice differ substantially among ethnic groups. The mean duration of postpartum abstinence period ranges from between 6.6 and 7.2 months among the Lomwe/Chuwabo to between 17.2 and 20.2 months among the Tsonga and Macua. This pattern may reflect ethnic differences in the postpartum abstinence taboo. According to Lomwe tradition the woman should abstain from sexual intercourse until the *Omwakulela Mwana* ceremony, which can take place as early as 4 months after the birth of the child (Pequenino 1995). The prescribed abstinence period for the Chuwabo is three months after delivery (Cavaleiro 1956). In contrast, Macua and Tsonga traditions prescribe much longer abstinence periods. Among the Macua, the mother should abstain from sexual intercourse for the whole duration of breastfeeding, which is 1.5-2 years (Martinez 1989:102-103). For the Tsonga, the nursing mother should abstain from sexual relations until the child strengthening ritual, which usually takes place one year or later after birth.

Ethnic patterns of the postpartum abstinence taboo seem to be related to the regional duration of the abstinence period. Longer durations of postpartum abstinence are observed in Northern and Southern Regions where live the ethnic groups with long sexual abstinence, the Macua and Tsonga, whereas in the Central Region where the Lomwe/Chuwabo live the durations are slightly shorter. For instance, the durations by which 25 per cent of women have resumed sexual intercourse are about 10 months in Northern Region, 7 in Southern and only 5 months in Central Region. Twenty-four months after giving birth only 25 per cent of women in Central Region are still abstaining, compared with more than 25 per cent of women still abstaining in Northern and Southern Regions more than 2 years after a birth.

6.4 Socio-economic differentials in postpartum variables: a multivariate analysis

The analysis in the preceding section revealed some socio-economic differentials in the duration of postpartum infecundability variables, especially the duration of postpartum sexual abstinence. Among the variables included in the bivariate analysis, education and ethnicity appeared to exert the strongest effects. However, because women of different educational levels and ethnic backgrounds also differ according to other socio-economic characteristics that are related to the duration of infecundability variables, little can be said about the effect of these variables if such factors are not taken into consideration. To account for such factors, this section applies a proportional hazards model (see Appendix A) to the 1997 DHS and examines the net effect of each covariant on the duration of postpartum infecundability variables. As noted in Chapter 5, the proportional hazards model is a suitable multivariate technique for the analysis of current status data because it allows for censored cases, that is, women who were still in postpartum condition at the time of the survey.

The independent variables, which were selected for explicit theoretical reasons and availability in the data set, include age, woman's and husband's education, woman's and husband's occupation, religion, ethnicity, place of residence, radio ownership (proxy for household living standards), current use of contraception, type of marriage and region.

The results of the net effect of each independent variable on the duration of postpartum infecundability variables are presented in Table 6.4. This table presents the risk that a woman in each category of each independent variable weans her child (column 1), resumes menstruation (column 2) and resumes sexual relations (column 3) by a given month following the birth of her child, compared with a woman in the reference category. The relative risk for a woman in the reference category is equal to unity (1.0) and a value of 1.0 in another category means that the risk of weaning, or resuming menstruation or sexual intercourse, for a woman in that category is the same as in the reference category. A value greater than 1.0 indicates a higher risk (shorter duration) than the reference category, whereas a value lower than 1.0 indicates a lower risk (longer duration) than the reference category.

There may be a question as to whether it is correct here to include contraceptive use as a predictor of postpartum abstinence. It has been included because women not willing to follow the prescribed period of abstinence and wanting to avoid an early pregnancy, may sbstitute contraception for abstinence. In fact the significant effect of contraception shown in Table 6.4 seems to support this argument.

In general, there are smaller socio-economic differentials in the duration of postpartum amenorrhoea than in the duration of either breastfeeding or postpartum sexual abstinence. This is not surprising because the resumption of menses is not under the voluntary control of the woman (Trussell et al. 1992) though it depends on the intensity and frequency of breastfeeding. Younger women have shorter durations of postpartum variables than older women, but the differences are small (although significant for women aged 15-24 for amenorrhoea, and 25-34 for breastfeeding and abstinence) indicating that these durations have been more or less stable over time.

The relative risks for education shows that husband's education does not have a significant effect on the duration of postpartum infecundability variables. By contrast, woman's education shortens the duration of postpartum sexual abstinence, reflecting the higher propensity of educated than uneducated women to break the traditional child-spacing practices. The risk that a woman with primary education will resume sexual relations in a given month after a birth is 20 per cent higher than for an uneducated woman, and with secondary education it is 68 per cent higher. This is consistent with findings on the Yoruba of Nigeria which identified education as the dominant factor of modernisation contributing to the erosion of the traditional norms surrounding sexual abstinence during the breastfeeding period (Caldwell and Caldwell 1981; Aborampah 1985; Feyisetan 1990; Benefo et al. 1994).

There is no significant association between either woman's or husband's occupation and the duration of postpartum amenorrhoea. In relation to breastfeeding, women whose husbands work outside agriculture in a white-collar or other activity have a higher risk of weaning than their counterparts with husbands working in agriculture, suggesting that the former curtail their breastfeeding because they have better access to breastfeeding supplements and other food sources for their children than the latter. Mott (1984) found similar results for Kenya. On the other hand, women whose husbands are not working breastfeed their children and abstain from sexual intercourse following a live birth longer than those whose husbands work in agriculture. For postpartum abstinence, woman's and husband's white-collar occupations lead to significantly shorter durations compared with agricultural occupation.

Regarding religion, women of Protestant religion breastfeed for a shorter period than women of Catholic religion while there is no difference between Catholics and those of other religion. The relative risk of weaning for a Protestant woman is 41 per cent higher than that of her Catholic counterpart. The reasons for such a difference are unclear, particularly because for amenorrhoea and sexual abstinence such a difference does not exist, but it is consistent with the bivariate analysis, which indicated a 3-month difference between Protestants and other religions. In relation to amenorrhoea and sexual abstinence, women with no religion have significantly longer durations than other women. This finding is not surprising because a large proportion of women in the 'no religion' category are probably believers in African traditional religions which have been associated with long periods of sexual abstinence in other African countries (e.g. Benefo et al. 1994).

Table 6.4 Relative risks of weaning, resuming menstruation and sexual relations following a live birth by socio-economic characteristics, Mozambique 1997

Socio-economic characteristics	Relative risk of		
	Weaning	Resuming menstruation	Resuming sexual relations
Age			
15-24	1.052	1.222 *	1.027
25-34	1.285 *	1.037	1.200 *
35-49®	1.000	1.000	1.000
Woman's education			
No education®	1.000	1.000	1.000
Primary	1.164	1.043	1.199 **
Secondary or higher	1.340	1.319	1.682 **
Husband's education			
No education ®	1.000	1.000	1.000
Primary	1.180	0.941	1.033
Secondary or higher	1.295	1.063	1.071
Woman's occupation			
Not working ®	0.940	1.124	1.144
Agriculture	1.000	1.000	1.000
White-collar	0.893	0.877	1.341 *
Other	0.863	1.319	1.136
Husband's occupation			
Not working	0.553 *	0.773	0.713 *
Agriculture ®	1.000	1.000	1.000
White-collar	1.401 **	1.042	1.190 *
Other	1.340 **	0.888	0.972
Religion			
Catholic ®	1.000	1.000	1.000
Protestant	1.407 **	0.826	0.850
Muslim	0.848	1.029	1.270
Zione	1.118	0.937	0.795
Other religion	1.183	1.061	0.899
No religion	1.070	0.771 **	0.758 *
Ethnicity			
Tsonga ®	1.000	1.000	1.000
Sena/Ndau	0.690	1.147	1.230
Lomwe/Chuwabo	0.798	1.398	7.609 ***
Macua	0.938	1.285	1.233
Other local	0.704	1.029	1.817 **
Portuguese/foreigner	0.929	1.384	1.155

Table 6.4 Continued...

Place of residence			
Urban ®	1.000	1.000	1.000
Rural	0.798 *	0.869	1.172 *
Household owns radio?			
Yes®	1.107	0.983	0.920
No	1.000	1.000	1.000
Currently using contraception?			
Yes	0.840	1.326 **	2.197 ***
No®	1.000	1.000	1.000
Type of marriage			
Monogamous®	1.000	1.000	1.000
Polygynous	0.766 **	1.081	0.880 *
Region			
Northern	0.663	0.730	2.037 ***
Central	0.888	0.989	1.971 **
Southern®	1.000	1.000	1.000
- 2 Log likelihood	8492.1	15425.8	18039.8
Chi-square	133.0 ***	88.8 ***	667.1 ***
No. of cases	2423	1233	2416

Notes: ® Reference category; *p≤0.05; **p≤0.01; ***p≤0.001.
Source: Computed from 1997 DHS.

There are no large ethnic differences in the duration of breastfeeding and postpartum amenorrhoea. In contrast, the duration of postpartum abstinence shows large and significant differences between ethnic groups, reflecting ethnic variation in the sexual abstinence taboo. Consistent with the bivariate analysis, the shortest duration is observed among the Lomwe/Chuwabo, with the risk of resuming sexual relations eight times higher than for the Tsonga. As stated earlier, sexual relations among the Lomwe/Chuwabo can resume as early as four months after birth, while among the Macua and the Tsonga, the two ethnic groups with the longest durations, this is unlikely to happen before one year after birth. For the Macua, whose risk of resuming sexual relations after birth is not significantly different from that of the Tsonga, sexual abstinence is prescribed for the entire breastfeeding period (Martinez 1989), whereas for the Tsonga, sexual relations are prohibited until the child-strengthening ceremony which usually takes place after the child's first birthday. These findings are not consistent with the argument that the duration of abstinence tends to be shorter in matrilineal societies than in patrilineal ones (Saucier 1972; Caldwell and Caldwell 1981; Lesthaeghe and Eelens 1989). Although the shortest duration is found in a matrilineal ethnic group, the Lomwe/Chuwabo, there are significant differences between the other matrilineal ethnic group (Macua) and the patrilineal Tsonga and Sena/Ndau.

Urban residence is associated with shorter durations of breastfeeding and amenorrhoea, but, surprisingly, urban residence is associated with a longer abstinence period. It is unclear whether this positive effect of urban residence on postpartum abstinence is genuine or an artefact of reporting errors. It could be that women reported what they know is a norm and not their actual behaviour. A study in Ghana (Benefo et al. 1994:317) found that there was a difference between the individual reports of actual abstinence behaviour and the ideal. On average, the duration of a respondent's ideal exceeded the actual duration by about three months. Although this could have happened in Mozambique, it is unclear why urban women would be more likely than their counterparts in rural areas to do this.

Women who were using modern contraception had significantly shorter durations of postpartum amenorrhoea and sexual abstinence than those who were not. For instance, the risks of resuming menstruation and sexual relations by a given month after delivery for women using modern contraception are 33 per cent and 120 per cent higher, respectively, than for women not using contraceptives. Oral contraceptives containing oestrogen sometimes decrease breastmilk production which in turn may affect the duration of postpartum amenorrhoea (Akin et al. 1986:252). Also, the negative relationship between use of contraception and duration of postpartum amenorrhoea may be explained by other mechanisms. A study in Bangladesh (Salway 2001:159-174) suggests that changes in the breastfeeding patterns may bring about an earlier resumption of menses which in turn leads to an adoption of contraception; and that the adoption of modern contraceptives (pills and injectables) by amenorrhoeic women may induce withdrawal bleeding shortly after first administration which is then reported as menses. In the case of postpartum sexual abstinence, the availability of contraceptives may encourage women abstaining in order to avoid an early pregnancy to decide to substitute contraception for abstinence, shortening the abstinence period (P. Caldwell and J. Caldwell 1981; Akin et al. 1986).

Polygyny is associated with longer durations of breastfeeding and postpartum sexual abstinence. The risks of weaning the child and resuming sexual relations after birth for women in polygynous unions are 24 per cent and 12 per cent respectively lower than the risks for women in monogamous marriages. This is probably explained by the fact that polygyny allows wives to breastfeed and to observe the postpartum abstinence taboo for a longer time without causing sexual deprivation to their husbands since the latter have other legitimate sexual partners while the husbands of monogamous women do not (Bongaarts et al. 1984; Lesthaeghe 1989; Pebley and Mbugua 1989). Wives in polygynous marriages may also breastfeed and abstain from sexual relations for longer periods because they come from more traditional backgrounds than wives in monogamous marriages (Pebley and Mbugua 1989:348).

Regional differences in the duration of postpartum variables are significant only for postpartum sexual abstinence. Women in Northern and Central Regions are twice as likely to resume sexual relations after childbirth as women in Southern Region. It could be that high male labour migration in Southern Region helps to maintain long durations by causing the separation of couples for prolonged periods.

6.5 Conclusion

This chapter examined socio-economic differentials in duration of breastfeeding, postpartum amenorrhoea and sexual abstinence using information on current status from the 1997 DHS. Current-status data were preferred to retrospective data because they are less subject to bias due to reporting errors, selectivity and censoring, although they are subject to larger sampling variability.

Findings in this chapter show an average duration of postpartum infecundability of 20.4 months (see Table 6.5), which is among the longest in sub-Saharan Africa. The durations of breastfeeding, postpartum amenorrhoea and sexual abstinence have been stable over time. In terms of socio-economic differences, more differences were observed in the duration of postpartum sexual abstinence than in the duration of breastfeeding and postpartum amenorrhoea. Woman's education, woman's and husband's occupation, ethnicity, place of residence, contraception, type of marriage and region all have a significant effect on the abstinence period, whereas husband's education, religion (except for women with no religion who have a longer duration than other women) and radio ownership are not significantly associated with the duration of sexual abstinence. A shorter duration of abstinence is associated with high levels of woman's education, practice of contraception, woman's and husband's white-collar occupation, monogamous marriage and being of Lomwe/Chuwabo ethnic background.

Table 6.5 Average duration (months) of infecundability variables by region, Mozambique 1997

Region	Breastfeeding	Postpartum amenorrhoea	Postpartum abstinence	Postpartum infecundability
Northern	25.8	18.0	18.8	21.9
Central	25.2	17.9	13.6	20.4
Southern	23.2	15.7	17.3	20.2
Mozambique	24.8	17.0	15.9	20.4

Note: Estimated by the P/I method (see Section 6.3.1).
Source: Computed from the 1997 DHS.

Among the factors mentioned above, education, contraceptive use and ethnicity had the strongest effects. Education and contraception are the most important modernisation factors facilitating the breakdown of the traditional practice of a long abstinence period, as has also been reported for West Africa (Caldwell and Caldwell 1981; Feyisetan 1990; Benefo 1995). In terms of ethnicity, the shortest durations are found among the matrilineal Lomwe/Chuwabo and the longest among the matrilineal Macua and patrilineal Tsonga. These findings do not entirely agree with previous research findings in sub-Saharan Africa regarding the association between descent system and abstinence taboo. According to these findings (Saucier 1972; P. Caldwell and J. Caldwell 1981; Lesthaeghe and Eelens 1989), long abstinence periods are associated with patrilineality, where bridewealth is a requirement for obtaining a wife, polygyny is widespread and social control over women's sexual activities is high, whereas short durations are more likely in matrilineal societies where women enjoy a status granting them considerable independence and initiative, possibly related to less emphasis placed on bridewealth. While this is valid for the Lomwe/Chuwabo and Tsonga, it is not for the Macua, suggesting that there are other cultural factors causing ethnic variation even within matrilineality or patrilineality.

Chapter 7

LEVELS AND DIFFERENTIALS OF INFERTILITY

7.1 Introduction

Pathological infertility is widespread in sub-Saharan Africa and has been reported as an important determinant of fertility (Frank 1983; Bongaarts et al. 1984; Mammo and Morgan 1986). Frank (1983), mapping the levels of infertility (as indicated by childlessness) in the region, found that its prevalence was remarkably widespread, and its level varied quite markedly even between small contiguous areas. Among the 21 countries for which Frank (1983:142) had data, the level of childlessness at age 45-49 ranged from 3 to 32 per cent, with an average of 12 per cent. The prevalence of infertility was highest in Central Africa, where the proportion of women aged 45 and over with no live birth was over 20 per cent in some countries (Zaire, Congo and Gabon), but it was also substantial in Southern and Eastern Africa, with Mozambique, Zambia, Tanzania and Angola the most affected (Frank 1983:142).

The prevalence of infertility in sub-Saharan Africa has received attention in the literature not only as an important public health issue or a determinant of fertility, but also as a social problem since African culture values reproduction, and infertility carries heavy social consequences. In this chapter, infertility levels and differentials are discussed. First, an overview of the main factors associated with infertility in sub-Saharan Africa is given, followed successively by a description of social and cultural aspects of infertility in Mozambique, estimation of the levels of primary and secondary infertility and discussion of socio-economic differentials, applying both bivariate and multivariate techniques.

7.2 The aetiology of infertility in sub-Saharan Africa

Epidemiological and socio-demographic studies suggest that high levels of sexually transmitted diseases (STDs) and other genital infections are the main causes of female infertility in sub-Saharan Africa (Adadevoh 1974; WHO 1975; Cates, Farley and Rowe 1985; Mtimavalye and Belsey 1987; Cates, Rolfs and Aral 1990; Larsen 1995b, a; Ericksen and Brunette 1996; Sundby 1997; Sundby, Mboge and Sonko 1998; Caldwell and Caldwell 2000). Among the STDs, gonorrhoea, chlamydia and syphilis are the main infections associated with infertility (Farley and Belsey 1988; Ericksen and Brunette 1996). Gonorrhoea and chlamydia infections are associated with acute pelvic inflammatory disease (PID), a supracervical infection involving the uterus, Fallopian tubes, ovary, or other internal pelvic organs (Gray 1983; McFalls and McFalls 1984; Cates, Rolfs and Aral 1993), which creates havoc by causing post-infection scarring that accompanies the healing process. Infertility occurs when bilateral intratubal adhesions interfere with the transit of sperm or ova either by damaging the mucosa and cilia or by blocking the Fallopian tubes (Cates et al. 1993:112). As a result, this may cause conceptive failure, ectopic pregnancy (pregnancy resulting from gestation elsewhere than in the uterus) and spontaneous abortion (McFalls and McFalls 1984). Syphilis, on other hand, is associated with foetal loss through spontaneous abortion and stillbirth (McFalls and McFalls 1984:309; Ericksen and Brunette 1996:214).

Apart from venereal diseases, genital tuberculosis (McFalls and McFalls 1984; Evina 1994) and malaria (McFalls and McFalls 1984; Pennington and Harpending 1991; Evina 1994; Larsen 1996) are also associated with infertility. Genital tuberculosis may interfere with the passage of gametes through the female genital tracts resulting in lower conception rates (McFalls and McFalls 1984:77-78). It may also cause pregnancy loss by interfering with the proper passage of the fertilised ovum through the Fallopian tubes or its implantation in the uterus, but this depends on the extent of damage before treatment (McFalls and McFalls 1984:78, 80).

Malarial infection may be associated with high risk of spontaneous abortion, stillbirth and premature birth, because of anaemia, haemolytic crisis, high fever and placental parasitisation associated with the infection (Gray 1983; McFalls and McFalls 1984). However, whether or not malaria will have a substantial effect on infertility in a given population depends on the species of malaria and the level of acquired and inherited immunity (McFalls and McFalls 1984). Plasmodium falciparum malaria, the most prevalent species in Mozambique (Machungo, Zaconato and Bergström 1997; Mendis et al. 2000) and Africa in general, is associated with the highest fevers, the most severe anaemia and the highest rates of placental parasitisation, which contributes to high risk of infertility in areas where this species is present (McFalls and McFalls 1984:131). Acquired and inherited immunity can limit fevers, anaemia and placental parasitisation (McFalls and McFalls 1984:131).

Postpartum and post-abortion infections are also associated with infertility in sub-Saharan Africa (Adadevoh 1974; WHO 1975; Larsen 1995a); these infections assume greater significance because health services are inadequate. For example, in Mozambique more than 55 per cent of deliveries take place at home (Gaspar et al. 1998:Table 8.4) and most induced abortions are performed outside the hospital or by unskilled providers (Hardy et al. 1997; Machungo et al. 1997; Agadjanian 1998b), putting the women involved at high risk of severe pelvic infection that can lead to subsequent infertility. The occurrence of an obstructed labour at home, without skilled obstetrical assistance, may cause secondary infertility due to tubal infection or amenorrhoea resulting from the failure of the uterus to respond to hormonal stimulation because of the extensive tissue devitalisation (McFalls and McFalls 1984:431). In addition, deliveries taking place at home are more likely to be under unhygienic conditions that may also increase the chance of postpartum infection. The woman in labour may lie on a dirty mat or sometimes on a bare floor and the traditional midwife may use her bare hands unwashed, with non-sterilised instruments, such as a piece of bottle glass, to cut the umbilical cord.

Abortion can result in tubal changes that predispose to ectopic implantation and subsequent pregnancy loss (McFalls and McFalls 1984:415). However, the risk of such complications and subsequent infertility depends not only on the skill of the provider but also on certain characteristics of the woman including age, parity, number of abortions and length of gestation (McFalls and McFalls 1984:408).

According to Evina (1994), the socio-cultural environment in which people live can accentuate certain constitutive elements of infertility by promoting behaviour that encourages it. For example, the strict observance of postpartum abstinence appears to be associated with higher levels of infertility, because it encourages higher sexual mobility of men during the abstinence period and hence a greater risk of infection (Frank 1983). Ali and Cleland (2001), for Côte d'Ivoire, and Lawoyin and Larsen (2002), for Nigeria, found that men were more likely to seek extramarital partners when they were observing the customary period of postpartum abstinence from marital sex than at other times. Polygyny, by multiplying the numbers of sexual partners, may increase the probability of contracting venereal diseases which, in turn, cause infertility (Garenne and van de Walle 1989; Sundby et al. 1998).

The prevalence of early marriage in sub-Saharan Africa may also be a contributor to infertility (Acsadi and Johnson-Acsadi 1990a; Evina 1994). Women who marry very young are exposed to pregnancies that they may not carry to term because of their physical immaturity, which leads to the possibility of an abortive infection and subsequent infertility (Evina 1994). Because physical maturity, especially of the pelvis, often lags behind the ability to conceive (Adadevoh 1974:9), young women are at greater risk of obstructed labour because the pelvis and its outlet may not be mature enough for the delivery of a foetus when conception occurs at a very early age (Adadevoh 1974:9-10; McFalls and McFalls 1984:431). Early age at marriage also increases the lifetime risk of contracting venereal diseases by exposing women to infection for longer (Larsen 1995b).

7.3 Social and cultural aspects of infertility in Mozambique

Childbearing in Mozambique remains an essential mark of 'personhood' and individuals who cannot bear children run the risk of being poorly regarded. Having children is a very important event among Mozambican women, not only for themselves and other close relatives, but also for their own or their husbands' lineages as a whole. Children are seen as a guarantee of the continuation of the lineage. The Macua saying *Oyara Wisopola*, 'having children is saving yourself', (Martinez 1989:90), is a clear indication that childbearing is perceived as transmission of life, a guarantee that the lineage or the family name will not die. An infertile person is regarded as suspending the continuation of life and failing to meet his or her reproductive obligation. Thus, marriage is mainly aimed at producing children. A failure of one of the partners to do so puts the continuation of the marriage at serious risk. Among the matrilineal Macua, infertility of either partner is a sufficient reason for divorce, whereas among the patrilineal Sena/Ndau and Tsonga, the barrenness of the wife gave the husband the right to restitution of the bride-wealth or to be presented with a substitute, usually the wife's sister, cousin or other relative (Ferreira 1960; Rita-Ferreira 1968; Feliciano 1998).

According to the focus group and in-depth interviews conducted among the Tsonga of Inhambane in 2001, the practice of replacing an infertile woman by her fertile relative has been abandoned, but an infertile woman is still more likely to be divorced or have a co-wife than her fertile counterpart. If it was the husband who was infertile, which was traditionally believed to be determined by a 'sperm test'[12], his wife was instructed by the elders to secretly get pregnant by his younger brother. This practice, however, has also been abandoned because, according to participants in focus group discussions, elders are no longer sure that the current younger generation would keep it secret in order to avoid quarrels between brothers. However, some women interviewed in Inhambane and Maputo City, including some university students, stated that if their husband was infertile, they would arrange to become pregnant by their husband's brother without the knowledge of either the husband or his relatives[13].

Although as detailed in the previous section infectious diseases are the main causes of infertility in sub-Saharan Africa, including Mozambique, there is a strong belief among many Mozambicans that infertility is a destiny or a punishment for bad behaviour or the transgression of customs or taboos, or a product of witchcraft[14]. Diseases were rarely mentioned as possible causes of infertility in the FGDs and in-depth interviews conducted in Inhambane. In contrast, destiny, witchcraft and the mishandling of menstrual blood were predominant. For example, the Tsonga believe that if the girl's first menstrual blood is put in a closed container without any access to air the concerned girl cannot conceive (for more detail see Wamir 1995). Although this is usually done to protect the girl from premarital pregnancy, it can render her infertile if the person who hid the menses, usually her paternal aunt, dies without showing the girl where her menses were hidden, or, if still alive, she does not uncover the menses because she did not approve of or benefit from the marriage. That is why, according to some participants in FGDs, the paternal aunt and the girl's mother are often the first to be blamed if the girl fails to conceive after marriage. Gerrits (1997) reported a similar belief among the Macua. On the last day of their initiation rites, the Macua girls have to shave their pubic hair, which must be wrapped in a piece of cloth and buried in the earth. It is believed that a witch can dig up this hair and treat it with certain medical plants to cause infertility in the girl concerned (Gerrits 1997:42).

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[12] According to some participants in FGDs, one way of determining who was infertile between the husband and wife was to give the wife a piece of white cloth and instruct her to clean her husband's genitals with it after sexual intercourse, and to fold it immediately, and take it to the elders the next morning. The elders would then unfold it in order to see if the husband's sperm was strong enough to impregnate a woman. It was believed that if the man was infertile the dried sperm would not stick on the cloth and it would unfold easily. Otherwise, the man would be fertile.

[13] This practice has also been reported for the Moba-Gurma of Togo, where if the man is sterile his wife is seen as justified in becoming pregnant by his brother, usually without the husband's knowledge (Pilon 1994:139).

[14] Similar beliefs have also been reported in other countries of sub-Saharan Africa (e.g. Kershaw 1973; Kisekka 1973; Mushanga 1973; Mwambia 1973; Caldwell and Caldwell 1990b; Upton 2001).

Barrenness is a significant social problem for a woman not only by making her a person of low status both in the family and in the community at large, but also because of social norms that proscribe the inclusion of infertile women in some important activities and ceremonies. Such exclusions make infertile women feel isolated from the community of which they are part. Among the Macua, women who have never been pregnant are not allowed to participate in the pregnancy ceremony (in which pregnant girls are instructed on how to behave while pregnant and in labour), to assist deliveries, or to be involved in conversation about these events (Gerrits 1997:46). They are also excluded from places where the bodies of dead people are washed or placed upon a bier. It is believed that the violation of this norm or taboo puts the health of the women and their relatives in serious danger (Gerrits 1997:46). Among the Tsonga also, an infertile woman is banned from assisting deliveries. In these matters, an infertile woman is still a 'child', unable to see another woman giving birth, even if she is over 40 years old (Inhambane Qualitative Data 2001). According to Feliciano (1998:320) an infertile Tsonga woman, since she 'expels the semen', was also not allowed to participate in the sowing of seeds because the seeds would not germinate.

An infertile person is also buried differently. Among the Tsonga, when an infertile woman dies she should be marked by a vegetal coal around her body from the head to the toe and back to the head again[15]. She may also be buried wearing her clothes inside out. According to the participants in FGDs and IDIs, this is aimed at showing that 'she did not do anything on earth' deserving of memory. It also makes sure that her misfortune will not persist. It is believed that, if this custom is not performed, the dead infertile woman will leave her infertility to her living relatives. This different burial for infertile persons makes women aspire to have children to avoid being marked by a coal when they die. For example, it is normal among the Tsonga women to answer *a ndzi lavi ku tsaliwa khala*, 'I do not want to be marked by a coal', when asked why they want to have children.

[15] Different burials for infertile persons have also been reported for a number of ethnic groups throughout sub-Saharan Africa. Among the Meru of Kenya, people who die without a child are referred to as having been lost because they have not left an heir and are buried with a *Mpogoro* (pulling-stick with a rope) because no one can touch a person who has not left anybody to succeed him or her (Njeru 1973:77). Among the Baganda of Uganda, when a childless man dies he is buried with a banana stem to prevent his spirit from troubling the children of his siblings demanding propitiation from them (Kisekka 1973:161). Some tribes in the Democratic Republic of Congo (former Zaire) buried infertile women with a spear in their stomach so that they would not be born again with the same condition (Guest 1978:2).

7.4 Levels and differentials

This section discusses regional and socio-economic differentials of infertility at the bivariate level. Primary and secondary infertility are estimated for several subgroups of women to examine whether the levels and age patterns differ. The section starts by discussing the concept of infertility and the measures of infertility used in the study, before presenting and discussing the results.

7.4.1 Measures of infertility

7.4.1.1 The concept of infertility

The terms 'infertility' and 'infecundity' or 'sterility' are commonly used to refer to the failure of a man, a woman or a couple to have a child. The use of these terms in the literature has not been uniform and in many cases they are used interchangeably (Vaessen 1984; Tesfaghiorghis 1990:117). The use of either 'infertility' or 'infecundity' varies according to whether one uses medical or demographic terminology. According to medical terminology, the term 'infertility' refers to the inability of a woman to conceive after a reasonable period of exposure to the risk of pregnancy which, according to the World Health Organization, is set at two years (WHO 1975:6). Primary infertility refers to a situation where a woman has never conceived despite being exposed to the risk of pregnancy for at least two years; and secondary infertility to a situation where a woman has conceived at least once but not subsequently, despite efforts to become pregnant. WHO (1975) distinguishes three concepts: infertility (the inability to conceive), pregnancy wastage (the inability to carry a conceptus to a live birth) and child loss (the failure of a live birth to survive).

The *Multilingual Demographic Dictionary* (IUSSP 1982:78) refers to the lack of the capacity of a man, woman or a couple to produce a live birth as 'infecundity' or 'sterility'. The inability to conceive is taken as the main, but not the single cause of sterility. A below-normal capacity to produce a child or a low probability of conception is low) is termed subfecundity. According to the *Multilingual Demographic Dictionary*, the term 'infertility' refers to the reproductive performance, that is, to the absence of an actual live birth during the period under review, rather than to capacity (IUSSP 1982:79).

This thesis uses the demographic terminology. 'Infertility' is here defined as the absence of a live birth for a woman during a given period of exposure to the risk of pregnancy, as a result either of the inability to conceive or the inability to carry a full-term pregnancy. Thus, a woman with primary infertility is one who has never given birth; and a woman with secondary infertility is one with at least one child but who has not had a subsequent child after a reasonably long period of exposure to pregnancy.

7.4.1.2 The measures used

Three measures of infertility, two for primary infertility and one for secondary infertility, are used in this thesis. The measures for primary infertility are the proportion of women aged 45-49 who are childless (nulliparous), and the proportion of women who remained childless after seven years of marriage without using modern contraceptives. Secondary infertility is measured by the proportion of non-contracepting women with at least one child who have failed to have a subsequent live birth after a further five years of exposure to childbearing.

The first measure of primary infertility (proportion of women 45-49 who are childless) was computed from the 1940, 1950, 1970, 1980 and 1997 Censuses. This measure, however, may not be a good indicator of primary infertility because it is subject to reporting errors and the effect of women who never marry. However, the 'never married problem' may not have a big impact because, as shown in Chapter 4, childbearing is not confined to marriage. But, to take into account its possible impact, never married women were excluded from the calculation of the proportion childless from the 1997 census and DHS presented in Tables 7.2 to 7.7.

Although women aged 45-49 are the most appropriate group of the available census data for studying infertility (the question on CEB was only asked of women 15-49), as they are closer to the end of their reproductive life, this group usually provides poor reporting of CEB and age. There is often a misclassification of stillbirths and children who died immediately after birth that results in some nulliparous women who have had a stillbirth being classified as parous and some parous women whose children died soon after birth as nulliparous. The instructions for the 1997 census, for example, were to record as a birth, any child that was born alive (which cried) even if it died immediately after birth (INE 1999b), but it is possible that some women misunderstood the question, especially older women. The direction and magnitude of this bias in the present data are unknown.

An alternative way of minimising this bias would be to base the estimates on the age group 40-44 (Vaessen 1984), but the data evaluation in Chapter 2 did not show substantial differences between the two groups in the reporting of either age or CEB. Thus, given that women in the age group 45-49 are closer to the end of the reproductive life than those aged 40-44, the former were preferred for this analysis.

The proportion of women who remained childless after seven years of marriage, and the proportion of parous women who have not had another child after five years, were estimated from the 1997 DHS by applying the Larsen and Menken (1989:189) 'subsequently infertile estimator'. The subsequently infertile estimator ($SI_a(T)$) is defined by the formula

$$SI_a(T) = W0_a(T) / W_a(T)$$

where $W0_a(T)$ is the number of women continuously married for at least T years subsequent to an age a who have no live births observed after age a; and $W_a(T)$ is the total number of women observed at age a.

The 'subsequently infertile estimator' uses the information during the last T years before censoring (date of the survey) to determine a woman's status as infertile or fertile T years before the survey. Although premarital childbearing is common in Mozambique (see Chapter 4), to ensure that all the analysed women are in a regular sexual union, the estimates are based only on ever-married women. For primary infertility the exposure to childbearing is assumed to start at the date of first marriage and end at the date of the survey. The exposure to childbearing is not assumed to start at the date of first intercourse because this may not represent the onset of regular sexual relations (Larsen 2000). Thus, a woman is considered infertile if she had no live birth during at least the seven years of marriage before the survey, otherwise she is considered fertile. According to Larsen and Menken (1989, 1991) 7 years of exposure are necessary to determine the fertility status of a woman following her first marriage because it is difficult to assess the regularity of sexual intercourse of non-contracepting women from survey data. In addition, estimates of primary infertility based on a period of exposure shorter than 7 years are sensitive to variations in fecundability, the monthly probability of conception (Larsen 2000:286).

For the estimation of secondary infertility the exposure begins at the birth date of the woman's last child and ends at the survey. A woman is secondarily infertile at the last observation (5 years before the survey) if she had no live births during the most recent 5 years before the survey, otherwise she is considered fertile. A woman who has not given birth at age *a* or later is defined as being 'infertile subsequent to age *a*'. The proportion subsequently infertile at age *a* at last observation is estimated as the number of women infertile subsequent to that age divided by the total number of women observed at the same age (Larsen and Menken 1989, 1991; Larsen 2000). The proportion subsequently infertile is estimated only for the age range 20-44 because for women younger than 20 years old it would be difficult to separate adolescent subfertility from infertility; and because since the survey included only women aged 15-49, and the 'subsequently infertile estimator' uses all information available for a woman until she is of an age which is 5 years lower than her age at the survey, the estimate cannot go beyond age 44 (Larsen 2000).

Infertility estimates derived from the subsequently infertile estimator may be subject to bias due to the failure to distinguish women who are infertile due to pathological causes from women who have deliberately prevented a birth for more than 5 years (secondary infertility) or 7 years (primary infertility). To assess the bias from contraception, Larsen (2000) calculated lower-bound (assuming that all current users of modern contraception were fertile at the interview) and upper-bound (ignoring the use of contraception) estimates of infertility for a number of sub-Saharan countries; she did not find much discrepancy between the two bounds: for Mozambique the difference was 0.1 (Larsen 2000:288). In this analysis the lower bound is used as the indicator, that is, all current users of modern contraceptives were assumed fertile at the interview. Although this may produce conservative estimates because some contraceptors may be infertile the bias is likely to be small because the use of contraception in Mozambique is low (see Chapter 8).

7.4.2 Results

Primary and secondary infertility levels were estimated for various subgroups of women including region, province (only the proportion of women 45-49 who are childless) education, place of residence, religion and ethnicity. Age-specific secondary infertility rates for women age 20-44 were also estimated and are given in Appendix Table F7.1.

7.4.2.1 Regional and provincial differences

Table 7.1 shows the proportion of childless women aged 45-49 by region and province from 1940 to 1997. No provincial data were available from the 1940 Census, and for the 1997 Census the proportions are also presented by place of residence. National and regional figures show that childlessness underwent a slight decline from 1940 to 1950 (except in Northern Region), a rise from 1950 to 1970, and a decline thereafter. Provincial figures, however, show contradictory trends: in some provinces the trends are similar to those for the country and regions, but in others they are different or unclear. Whether these trends are genuine or a reflection of data quality it is difficult to tell, but according to the United Nations (1981), official reports during the 1950s and 1960s noted a high prevalence of infertility-related diseases such as malaria, tuberculosis and venereal diseases and much of the population did not have access to hospitals since the health services provided by the Portuguese administration were concentrated in urban centres and intended largely for the non-indigenous population. In Southern Region, the effect of high labour migration to South Africa and Maputo City in spreading venereal diseases, and the high prevalence of polygyny, were thought to have interacted to produce high rates of infertility (United Nations 1981:37). Labour migrants are likely to have frequent unprotected contacts with prostitutes while away in South Africa or Maputo City, increasing the likelihood that STDs they acquired are passed on to their wives when they visit home.

Table 7.1 Percentage of childless women aged 45-49 by region, province and place of residence, all women, Mozambique 1940-1997

	% childless by census year						
	1940	1950	1970	1980	1997		
Region/Province					Total	Rural	Urban
Northern	**19.2**	**19.4**	**24.8**	**15.8**	**9.8**	**9.7**	**10.2**
Niassa		22.5	14.6	6.1	6.4	6.4	6.0
Cabo Delgado		22.5	26.1	13.7	8.6	8.5	9.0
Nampula		18.0	25.7	18.6	11.3	11.2	11.5
Central	**8.8**	**8.3**	**12.1**	**8.2**	**7.1**	**7.0**	**7.2**
Zambézia		7.3	13.2	8.1	7.6	7.7	7.2
Tete		9.4	14.1	7.2	5.8	5.7	6.4
Manica		9.4	9.0	8.5	6.6	6.6	6.6
Sofala		9.4	9.0	9.6	7.3	7.1	7.8
Southern	**17.1**	**15.0**	**16.6**	**13.3**	**8.5**	**8.6**	**8.3**
Inhambane		17.8	21.4	13.9	10.6	10.2	13.0
Gaza		11.7	12.9	13.0	7.0	7.1	6.7
Maputo Province		18.5	15.0	13.9	7.6	7.7	7.6
Maputo City		18.5	15.0	11.9	7.8		7.8
Mozambique	**15.3**	**13.8**	**17.3**	**12.3**	**8.4**	**8.4**	**8.5**

Source: Computed from 1940 Census (Repartição Técnica de Estatística 1945); 1950 Census (Repartição Técnica de Estatística 1955); 1970 Census (INE 1974); 1980 Census Unpublished Tables; 1997 Census data set.

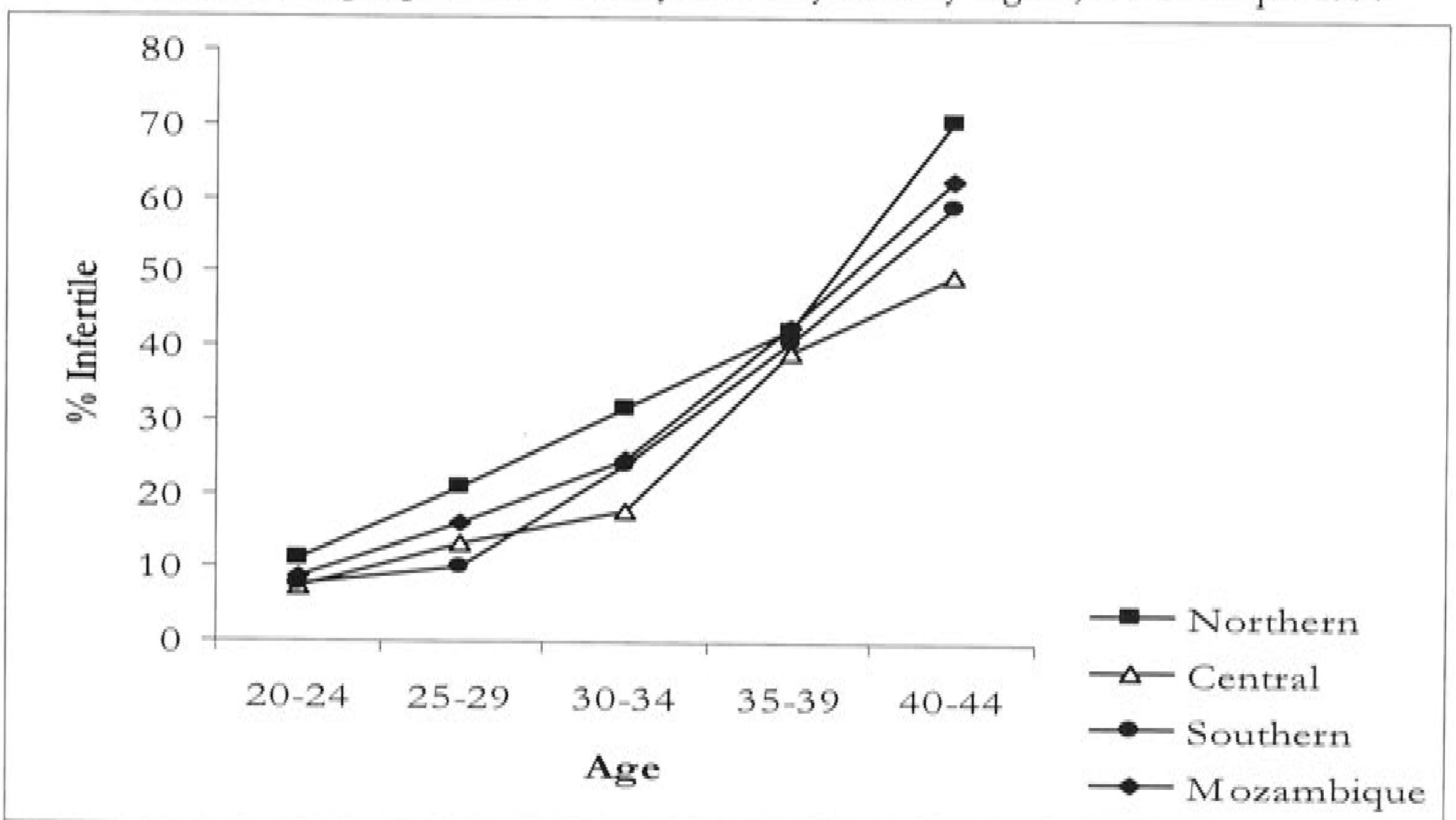
Studies in the high-infertility belt of sub-Saharan Africa (Caldwell and Caldwell 1983, 2000) suggest that the proportion childless peaked in the 1940s and that the increasing trends reversed after the World War II mainly in response to the WHO penicillin campaigns against yaws and other diseases. However, Table 7.1 shows that in Mozambique the peak occurred much later, in 1970, although the quality of the data casts some doubts on the accuracy of this. The decline in infertility after 1970 is a reflection of the 'health revolution' brought about by the FRELIMO government in the first years of independence. Although many doctors left the country at the independence, health policy was singled out as a model by the World Health Organization, as health services became free and mass vaccination campaigns were established for primary and preventive care, covering most of rural areas through Health Centres and mobile clinics (Segall 1977; Potts and Marks 2001).

Table 7.2 Percentage with primary and secondary infertility by region among ever married women, Mozambique 1997

Region	Primary infertility				Secondary infertility[b]	
	% 45-49 childless		Childless after at least 7 years of marriage[b]		% women aged 20-44 infertile	Sample size
	Census[a]	DHS[b]	%	Sample size		
Northern	9.4	8.0	5.0	1494	25.1	1467
Central	6.5	6.2	1.8	1815	15.9	1901
Southern	7.7	6.5	3.8	1382	21.8	1511
Mozambique	7.8	7.0	3.6	4690	21.3	4879

Source: Computed from [a]1997 Census and [b]1997 DHS.

Figure 7.1 Age-specific secondary infertility rates by region, Mozambique 1997



Source: Computed from 1997 DHS.

The measures of primary and secondary infertility presented in Tables 7.1 and 7.2 show a distinct regional pattern and, for primary infertility, it has not changed over time. In Table 7.2 the figures estimated from the census suggest higher proportions childless than the DHS, probably because some women with parity 'not stated' have been recorded as zero parity. The level of infertility is highest in Northern Region (especially in Nampula and Cabo Delgado), intermediate in Southern Region and lowest in Central Region. In 1997, primary infertility, as measured by the percentage childless after at least 7 years of marriage, ranged from 1.8 per cent in Central Region to 5.0 per cent in Northern Region, with a national average of 3.6 per cent, whereas secondary infertility ranged from 15.9 per cent in Central Region to 25.1 per cent in Northern Region, with a national average of 21.3 per cent. The age-specific secondary infertility rates by region are presented in Figure 7.1.

Regional differences in the prevalence of infertility-related diseases such as STDs and malaria may be one potential explanation for this pattern, but it is difficult to establish a link between regional levels of infertility and these diseases because data on the prevalence of the diseases are unreliable: health coverage is poor and a significant proportion of people who get these diseases resort to traditional healers (Green, Jurg and Dgedge 1993) or self-medication (Vaz, Gloyd and Trindade 1996). Presented in Table 7.3 are the incidence rates of STDs and malaria by region from 1997 to 2000, computed from the Ministry of Health annual records on cases of STDs and malaria (Ministério da Saúde 1998, 1999, 2000). These rates are not consistent with the regional pattern of infertility and appear to reflect more the regional differences in health care coverage than the actual difference in the incidence of either STDs or malaria. Thus, apart from showing an increase over time (except in Northern Region), a reflection of increasing coverage of the health system since the end of the civil war, they are of little use in explaining regional differences in infertility.

Studies of small areas and selected groups have reported much higher prevalence of STDs than the figures shown in Table 7.3. For example, a nationally representative AIDS prevention survey conducted in 1996 found that 12.6 per cent of men aged 15 to 49 noted symptoms of STDs in the 12 months preceding the survey, with the provinces of Maputo (20%) and Cabo Delgado (18.9%) recording the highest and second highest respectively (PSI-Mozambique 1998:27). A study of STDs prevalence in a rural area of northern Inhambane found that there was evidence of one or more STDs in 51 per cent of pregnant women, 59 per cent of female patients and 65 per cent of male patients (Vuylsteke et al.

1993:428). Vaz et al. (1996:52) found that 39 per cent of prisoners in Maputo City had a history of STDs. Studies on pregnant women suggest a syphilis seroprevalence that ranges from 12 to 42 per cent (Cossa et al. 1994; Folgosa et al. 1996).

Table 7.3 STDs and malaria incidence rates by region, Mozambique 1997-2000

	STDs incidence rate[a]			Malaria incidence rate[b]		
Region	1997	1998	1999	1998	1999	2000
Northern	1.5	1.5	1.3	0.2	7.4	12.3
Central	1.5	2.9	3.6	1.7	9.3	13.0
Southern	3.1	3.0	4.3	1.7	29.6	37.2
Mozambique	1.9	2.5	3.1	1.2	13.9	19.0

Notes: a STD incidence rate =Cases of STD/Population 15 and over; b Malaria incidence rate = Cases of Malaria/Total population.
Source: Cases of STD and Malaria from Ministério da Saúde (1998, 1999, 2000) and population from INE projections (INE 1999d).

These levels of STDs prevalence suggest high risk-taking sexual behaviour in the population. The National AIDS Prevention Survey found that risk behaviour (having one or more non-regular sexual partners including contact with commercial sex workers) was highest in Northern Region, followed by Southern Region and then Central Region. By province, Cabo Delgado, Nampula, Niassa and Inhambane registered the highest risk behaviour (PSI-Mozambique 1998). This regional and provincial pattern is similar to that of infertility presented in Tables 7.1 and 7.2.

Although there are no reliable data, Mozambique has a high prevalence of malaria and pregnant women are among the most susceptible to contracting the disease, increasing the risk of infertility (Granja et al. 1998). The 1996-1997 Household Survey found that 25 per of people who reported a symptom of illness in the month before the survey had malaria (INE 1998b:32), while three blood surveys of residents of Matola (a satellite of Maputo City) conducted between 1994 and 1996 found that the prevalence of malaria ranged from 33 to 63 per cent (Mendis et al. 2000:177). Malaria is also the single most important cause of death in the country and is responsible for a substantial proportion of maternal mortality. A study of pregnancy-related maternal deaths at the Central Hospital of Maputo between 1989 and 1993 found that 16 per cent of the deaths were directly attributable to malaria (Granja et al. 1998:258-259).

7.4.2.2 Education and infertility

The hypothesised relationship between education and infertility is through differential knowledge about risk behaviour leading to venereal diseases and the ability to seek treatment when needed (Larsen 1989, 1995b). Since education may increase women's ability to avoid contracting an infection, by practising safe sex and being aware of the importance of hygienic conditions at delivery, infertility may be expected to be higher among uneducated than educated women. Also, education is associated with high socio-economic status and urban residence, factors that are in turn associated with better access to sanitary facilities.

However, in sub-Saharan Africa, education appears to have no effect on infertility (Larsen 1989, 1995b; Caldwell and Caldwell 2000). For example, multivariate analyses by Larsen (1989, 1995a) for Cameroon, Nigeria and Sudan did not find any difference by educational level in the odds of being infertile. Table 7.4 presents the three measures of infertility by educational level for Mozambique. Both primary and secondary infertility estimated from the DHS data set are consistent with the expectation of an inverse relationship between education and infertility but the differences are not large in the case of primary infertility. Surprisingly, however, the census shows slightly higher primary infertility for women with secondary education than those with primary education. The reasons for this pattern are unclear but it may be due to reporting errors. As stated earlier, this measure is subject to bias due to age misreporting, the 'not stated' problem (see Chapter 2) and the misclassification of infant deaths and stillbirths.

Table 7.4 Percentage with primary and secondary infertility by educational level among ever married women, Mozambique 1997

Educational level	Primary infertility			Secondary infertility[b]	
	% 45-49 childless[a]	Childless after at least 7 years of marriage[b]		% women aged 20-44 infertile	Sample size
		%	Sample size		
No education	8.1	3.8	2502	23.2	2505
Primary	6.1	3.3	2074	17.8	2221
Secondary or higher	6.4	2.9	114	11.8	154
Total	7.8	3.6	4690	21.3	4879

Source: Computed from [a]1997 Census and [b]1997 DHS.

7.4.2.3 Rural-urban residence and infertility

Like education, rural-urban differences in infertility may be linked to rural-urban differences in the prevalence of venereal diseases, access to treatment and practice of midwifery (Larsen 1989; Ericksen and Brunette 1996). Women living in urban areas are at greater risk of STDs than rural villagers. Although medical treatment is more readily accessible in urban than rural areas, the higher prevalence of prostitution in urban areas makes urban women more exposed than rural women to venereal diseases that are likely to cause infertility. In addition, since infertile women in sub-Saharan Africa are more likely to divorce or be abandoned by their husbands, they may be forced to move to cities (Larsen 1995b:331). On the other hand, women in rural areas may be more likely to have secondary infertility than urban women, because the risk of infection during previous deliveries or abortions is higher in rural areas, where more births occur at home under poor sanitary conditions and attended by unskilled midwives (Larsen 1989:174).

Table 7.5 shows that both primary and secondary infertility are higher in rural than urban areas, but the difference is not large: two percentagepoints for primary infertility (proportion childless after at least 7 years of marriage) and four percentage-points for secondary infertility.

Table 7.5 Percentage with primary and secondary infertility by place of residence among ever married women Mozambique 1997

Place of residence	Primary infertility				Secondary infertility [b]	
	% 45-49 childless		Childless after at least 7 years of marriage [b]		% women aged 20-44 infertile	Sample size
	Census[a]	DHS[b]	%	Sample size		
Urban	7.5	5.4	1.8	962	18.5	1044
Rural	7.9	7.3	3.8	3728	22.6	3835
Total	7.8	7.0	3.6	4690	21.3	4879

Source: Computed from [a]1997 Census; [b]1997 DHS.

7.4.2.4 Religion and infertility

Differentials in infertility levels by religion in sub-Saharan Africa have not been clearly established (Caldwell and Caldwell 2000:171). Some studies have found that infertility is higher among Muslims than Christians (Caldwell and Caldwell 1983; Larsen 1989, 1995b), while in others (e.g. Tesfaghiorghis 1990:133) infertility was found to be higher among Christians than Muslims. To assess the relationship between religion and infertility in Mozambique, primary and secondary infertility were estimated by religious affiliation and the results, which are presented in Table 7.6, show considerable differences in infertility level. Muslims have the highest level of infertility while those who profess 'Other religion' have the lowest, as indicated by the DHS. This may partly reflect earlier marriage and higher marital instability and polygyny among Muslims than Christians, especially Catholics. Also, 71 per cent of Muslims are ethnic Macua who, as discussed in the next section, have high levels of infertility. The Zionists, who were found to have the highest marital instability in Chapter 5, have the second lowest primary infertility (proportion childless after at least 7 years of marriage) but the second highest secondary infertility. Although this may suggest that unhygienic midwifery practices leading to a high likelihood of infection after giving birth may be more important among Zionists than other religions, it is unlikely to be the case because the Zionists are the most educated and live in the Southern Region where health facilities are more accessible than in the other regions (see Chapter 1). The high secondary infertility observed among the Zionists is probably because infertile women of other religions are likely to join Zionism in the hope that their infertility will be cured.

Table 7.6 Percentage with primary and secondary infertility by religious affiliation, ever-married women, Mozambique 1997

Religion	Primary infertility			Secondary infertility[b]	
	% 45-49 childless[a]	Childless after at least 7 years of marriage[b]		% women aged 20-44 iInfertile	Sample size
		%	Sample size		
Catholic	7.1	2.7	1365	20.2	1434
Protestant	7.0	2.9	594	17.5	630
Muslim	9.3	5.7	884	24.6	862
Zionist	6.7	1.8	416	22.1	433
Other religion	8.7	1.1	283	12.1	309
No religion	7.7	3.3	1040	17.0	1074
Total	7.8	3.6	4690	21.3	4879

Source: Computed from [a]1997 Census; [b]1997 DHS.

7.4.2.5 Ethnicity and infertility

Ethnicity (or cultural factors) can be an important determinant of infertility because it determines the standards of appropriate sexual and marital behaviour such as normative age at marriage, acceptability of polygyny, divorce and remarriage, informal unions and premarital or extramarital sexual relations. Indeed, studies in sub-Saharan Africa (Romaniuk 1968; Retel-Laurentin 1974; Caldwell and Caldwell 1983, 2000; Frank 1983; Larsen 1989) found that infertility levels changed more sharply on ethnic boundaries than on national or geographical boundaries, suggesting that a substantial part of the explanation of infertility lies in cultural practices. This led Romaniuk (1968) and Frank (1983) to suggest that, for a fertility map to be meaningful in this region, it must be based on the tribe or ethnic group. Ethnic groups with marital customs that favour sexual freedom, especially for its young people, are more likely to have a high prevalence of infertility than ethnic groups that practise strict marital laws. Caldwell and Caldwell (1983:8) noted that whenever two adjacent ethnic groups exhibiting different levels of infertility were matched it was found that premarital or extramarital sexual relations were freer among the group with the higher level of infertility. Retel-Laurentin (1974:72) found that in the Central African Republic the Yacoma people had more children than their neighbours, Nzakara, because the latter had a high prevalence of venereal diseases whereas the former were practically untouched by these diseases, and there was no intermarriage between the two. Similarly, the differences in fertility between the neighbouring Kanuri and Bura-speaking people of Northeast State of Nigeria (Cohen 1974:54-55) and between the neighbouring Fulani and Gbaya of Northern Cameroon (Burnham 1974:41) could be explained by differing marital customs and sexual behaviour. The Kanuri and the Fulani married younger and had higher divorce rates and sexual freedom than their neighbours, which allowed for the more rapid spread of venereal diseases and subsequent infertility.

Table 7.7 Percentage with primary and secondary infertility by ethnicity, ever-married women, Mozambique 1997

Ethinicity	Primary infertility: % 45-49 childless[a]	Primary infertility: Childless after at least 7 years of marriage[b] %	Primary infertility: Childless after at least 7 years of marriage[b] Sample size	Secondary infertility[b]: % women aged 20-44 infertile	Secondary infertility[b]: Sample size
Tsonga	7.7	3.8	1323	21.7	1426
Sena/Ndau	6.2	1.3	1094	14.2	1168
Lomwe/Chuwabo	6.6	2.7	405	19.2	413
Macua	9.6	5.0	1496	25.6	1472
Other local	6.5	4.7	234	21.6	229
Portuguese/foreigner	6.7	1.3	75	12.3	106
Total	7.8	3.6	4690	21.3	4879

Source: Computed from [a]1997 Census; [b]1997 DHS[b].

In Mozambique, the estimates of infertility by ethnic affiliation presented in Table 7.7 show substantial differences. Infertility is highest among the Macua followed by the Tsonga and lowest among the Sena/Ndau. For example, only 1.3 per cent of Sena/Ndau women remain childless after at least 7 years of marriage compared with 3.8 per cent of Tsonga and 5.0 per cent of Macua. In relation to secondary infertility the differences are much larger with the percentage of women with secondary infertility ranging from 14.2 per cent among the Sena/Ndau to 25.6 per cent among the Macua. There are substantial differences within both matrilinearity (infertility higher among the Macua than the Lomwe/Chuwabo) and patrilinearity (infertility higher among the Tsonga than the Sena/Ndau), suggesting that there is a considerable variation in marital and sexual behaviour between ethnic groups with the same system of descent. It is also important to note that the two ethnic groups with the highest levels of infertility (Macua and Tsonga) are those practising long postpartum sexual abstinence (see Chapter 6) which suggests that the high sexual mobility of men during the abstinence period may facilitate the spread of STDs associated with infertility.

The high level of infertility among the Macua is consistent with their marriage pattern and sexual behaviour. The Macua marry very early and have high marital instability (see Chapter 5). They are known to have great sexual freedom including extramarital sexual relations. According to Martinez (1989) a Macua husband could allow his wife to have sexual relations with a visitor as a sign of respect, and two friends could exchange wives for a certain period as a sign of good friendship. During the initiation the Macua girls are advised by older women that they should never rely on only one man, and once married their mothers usually act as intermediaries between the women and their lovers, to keep the liaisons secret from their husbands (Daniel 1995:63). For the Macua women, single or married, sex is a source of financial and material support, a fact considered *adulterio organizado*, 'organised adultery', by Daniel (1995:63). Extramarital sexual relations are even more commonly acceptable for men and women who are infertile, or suspected of being infertile. For example, all but one of the infertile Macua women interviewed by Gerrits (1997:45) in Montepuez (Cabo Delgado Province) reported having regular sexual relations with various partners either because the traditional healer advised them to do so or to check whether the 'blood of another man was more compatible'.

The Tsonga, on the other hand, are very strict in relation to the sexual activity of married women but are more tolerant of premarital sex. No man is condemned for having sexual relations with an unmarried girl because, since the Tsonga practise polygyny, any man, single or married, is a potential husband (see Junod 1974). High male labour migration and polygyny have long been suspected to spread venereal diseases that lead to infertility among the Tsonga (United Nations 1981).

As shown in Table 7.8, junior wives in polygynous marriages exhibit higher levels of infertility than senior wives and monogamous wives, reflecting the tendency of divorced infertile women to remarry a polygynist. Surprisingly, however, the Sena/Ndau, who along with the Tsonga have a high prevalence of polygyny, exhibited the lowest level of infertility (Table 7.7). It is unclear why the ethnic Sena/Ndau have low infertility despite having the highest prevalence of polygyny. However, the difference between the Sena/Ndau and Tsonga levels of infertility may be related to the number of wives per man and tolerance of premarital sexual relations. Although polygyny is more prevalent among Sena/Ndau than among the Tsonga, the average number of wives is lower in the former. The DHS data show that as many as 65 per cent of Tsonga women in polygynous unions had two or more co-wives compared with 46 per cent among the Sena/Ndau. Premarital sexual relations appear to be more tolerated among the Tsonga than among the Sena/Ndau: for example, Tsonga never-married women contributed 14 per cent to extramarital births in the year before the 1997 Census compared with only 3 per cent for the Sena/Ndau (see Chapter 4). Since this difference cannot be attributed to contraceptive use, which is higher among the Tsonga than the Sena/Ndau, it may be related to a differing tolerance of premarital sexual activity.

Table 7.8 Percentage with primary and secondary infertility by type of marriage, Mozambique 1997

Type of marriage	Primary infertility (childless after at least 7 years of marriage)		Secondary infertility	
	%	Sample size	% women aged 20-44 infertile	Sample size
Monogamous	3.1	2751	18.9	2929
Senior wife	2.4	593	21.0	598
Junior wife	3.8	612	23.2	628
All ever-married	3.6	4690	21.3	4879

Source: Computed from 1997 DHS.

7.5 The determinants of infertility: a multivariate analysis

The previous section has shown that the levels of both primary and secondary infertility vary considerably according to woman's socio-economic characteristics, especially according to region, ethnicity, religion and place of residence. In this section multivariate analysis is applied to assess whether such differences remain sizeable and significant after other socio-economic characteristics have been controlled for.

For primary infertility the dependent variables were constructed from the two measures used in the bivarite analysis: the proportion of women aged 45-49 who are childless (from the census) and the proportion of women aged 25-49 at the survey who remained childless after at least 7 years of marriage (from the DHS). Dichotomous variables were constructed for each measure, indicating respectively whether or not a woman aged 45-49 is childless (coded '1' if childless and '0' if not), and whether or not a woman aged 25-49 at the survey, who has been married for at least 7 years and is not using any modern contraceptive, is childless (coded '1' if childless and '0' if not); a logistic regression model was fitted to assess the net effect of each independent variable. For the women aged 45-49 in the census, the model was fitted to a randomly selected sample of about 11,500 women.

The dependent variable for secondary infertility was constructed from the 'subsequently infertile estimator' for secondary infertility. Each parous woman aged 25-49 at the survey was first assigned fertile or infertile status as described earlier (Section 7.4.1.2). If infertile she was coded '1' and if otherwise she was coded '0'. Then a logistic regression model was fitted to determine the odds of being secondarily infertile by socio-economic characteristics.

The independent variables include education, employment status, religion, place of residence, ethnicity, radio ownership (a proxy for household living standards), parity, age, number of unions, age at first marriage, age at first sexual intercourse, marital status, prior contraceptive experience and region. The type of assistance received at the last delivery[16] and the number of induced abortions were not included due to lack of data.

[16] In the DHS, questions were asked only about deliveries that had occurred during the last three years preceding the survey.

Table 7.9 Odds ratios of having primary and secondary infertility by woman's socio-economic characteristics, ever-married women, Mozambique 1997

Socio-economic characteristics	Odds ratio of being		
	Childless at age 45-49[a]	Childless after at least 7 years of marriage[b]	Secondarily infertile[b]
Education			
No education ®	1.000	1.000	1.000
Primary	0.794 *	0.845	1.032
Secondary or higher	1.109	0.316	1.409
Employment status			
Not working ®	1.000	1.000	1.000
Unpaid worker	0.745 *	0.362 **	0.961
Self-employed	0.661 ***	0.955	1.062
Paid worker	0.617 *	0.677	1.828 *
Religion			
Catholic ®	1.000	1.000	1.000
Protestant	0.807	0.790	0.940
Muslim	1.025	0.740	1.225
Zionist	0.946	1.013	0.752
Other religion	0.913	0.600	0.693
No religion	1.080	1.042	0.726
Ethnicity			
Tsonga ®	1.000	1.000	1.000
Sena/Ndau	0.662	1.064	1.109
Lomwe/Chuwabo	0.787	1.856	1.200
Macua	0.763	3.644	2.240 *
Other local	0.587	4.130 *	2.063
Portuguese/foreigner	1.135	5.794 **	1.041
Place of residence			
Urban ®	1.000	1.000	1.000
Rural	0.864	1.201	0.990
Household owns radio			
Yes ®	1.000	1.000	1.000
No	1.208 *	1.206	0.946
Parity			
1 ®			1.000
2 – 3			0.139 ***
4 +			0.023 ***
Single age	1.019	1.028	
Age group			
20 – 24 ®			1.000
25 – 29			6.088 ***
30 – 34			12.559 ***
35 – 39			40.118 ***
40 – 44			100.396 ***

Table 7.9 Continued...

Socio-economic characteristics	Odds ratio of being Childless at age 45-49[a]	Childless after at least 7 years of marriage[b]	Secondarily infertile[b]
Number of unions			
1 ®		1.000	1.000
2+		2.263 ***	2.177 ***
Age at first marriage			
< 15		0.577	2.425 ***
15 –17		0.554 *	1.981 ***
18 –19		0.834	1.714 **
20 + ®		1.000	1.000
Age at first intercourse			
< 15 ®		1.000	1.000
15 –19		1.743	0.551 **
20 +		1.380	0.411 **
Marital status			
Monogamous ®		1.000	1.000
Senior wife		0.792	1.317
Junior wife		1.175	0.994
Divorced/widow		0.872	1.990 **
Ever used contraceptives			
No ®		1.000	1.000
Yes		0.125 ***	0.220 ***
Region			
Northern	1.309	0.599	0.752
Central	0.896	0.412	0.625
Southern ®	1.000	1.000	1.000
Constant	-2.7 *	-4.6 ***	-0.8 *
- 2 Log likelihood	6610.8	974.8	2569.3
Chi-square	66.4 ***	117.5 ***	1211.0 ***
No. of cases	11422	3794	3630.0

Notes: ® Reference category; * p≤0.05; ** p≤0.01; *** p≤0.001.
Source: Computed from [a]1997 census; [b]1997 DHS.

The net effects of woman's socio-economic characteristics on the odds of being infertile are presented in Table 7.9. Education, religion, place of residence and radio ownership do not have a statistically significant effect on either primary or secondary infertility[17]. This seems consistent with findings elsewhere in sub-Saharan Africa (Larsen 1989, 1995b; Menken and Larsen 1994; Caldwell and Caldwell 2000). However, in the analyses by Larsen

[17] The model fitted to the census data shows that primary education is significantly associated with lower infertility compared with no education, and that having a radio in the households reduces the odds of having primary infertility compared with not having one. However, this result should be interpreted with caution, because, as mentioned earlier, the data are subject to bias due to reporting errors, and many important factors could not be controlled for because the census did not collect the required information.

(1989, 1995a) and Menken and Larsen (1994) in Cameroon, Nigeria and Sudan, place of residence and religion remained significant after controlling for other variables, with infertility being higher in urban than in rural areas and among Muslims than Christians.

Only marital status and the ages at first sexual intercourse and first marriage and have a significant effect on secondary infertility. However, there is a significant negative effect of marrying between 15 and 17 years on primary infertility compared with marrying at age 20 or later. Women who became sexually active or married young are more likely to have secondary infertility than those who had their first sexual intercourse or married later. Starting sexual activity or marrying early exposes women to pregnancies at an age at which they are unable to carry them to term or are at a greater risk of an obstructed labour that can result in an infection leading to subsequent infertility. This is supported by a strong negative association between parity and secondary infertility that may imply that when the onset of infertility results from an infection at delivery, it tends to occur to low parity women who are likely to be young.

In relation to marital status, the results show than senior wives in polygynous unions and women who are divorced or widowed are 32 per cent and 99 per cent respectively more likely to have secondary infertility than monogamous women, but only the odds ratio for divorced or widowed women is statistically significant at the 5 per cent level. This is consistent with the fact that a woman who is unable to bear children is at risk of gaining a co-wife or being divorced. However, it is important to note that a significant proportion (36% according to the 1997 Census) of women who are not in a union are widows, and may have been less exposed to the risk of pregnancy than those in unions or divorced. This is because some cultural taboos prescribe a period of sexual abstinence after widowhood which can be as long as one year or more (see Junod 1974).

The number of unions has a strong effect on both primary and secondary infertility. Women who have been married twice or more are twice as likely to be infertile as women who have married only once. However, infertility can be both a consequence and a cause of marital instability. On the one hand, marital instability, by exposing women to multiple sexual partners, increases the risk of infection by venereal diseases that are associated with infertility. On the other hand, infertile women are more likely to be divorced or abandoned by their husbands.

Ethnic differences in both primary and secondary infertility were substantially reduced by the introduction of the control variables, suggesting that most of the variation identified in the bivariate analysis is explained by other factors, especially age at first marriage and first intercourse, and marital stability. However, in relation to secondary infertility, the pattern of relationship (of highest infertility among the Macua) observed in the bivariate analysis remains. For primary infertility, women of 'Other' ethnic and those of Portuguese/foreigner backgrounds are significantly more likely to be infertile than the Tsonga. Given the heterogeneous composition of both groups this pattern is difficult to interpret.

Table 7.9 also shows that the odds of infertility vary according to employment status, contraceptive experience and age, but the differences are less in the DHS (where more control variables were used) than in the census. Women who have ever used a modern contraceptive have lower odds of infertility than those who have no such experience, indicating, perhaps, that never-contraceptors are selected for lower fertility and high infertility. Also, consistent with the effects of biological ageing on differentials in infertility, the odds of infertility increase steeply with woman's age.

7.6 Conclusion

Findings from this chapter show that infertility affects a substantial proportion of Mozambican women and that the social stigma associated with infertility is still quite strong. The estimates from the 1997 DHS show levels of infertility that are just below those observed in the high infertility countries of Central Africa (see Larsen 2000). Primary infertility ranges from 2 per cent in Central Region to 5 per cent in Northern Region, with a national average of 4 per cent; and secondary infertility ranges from 16 per cent in Central to 25 per cent in Northern Region, with a national average of 21 per cent for women aged 20-44. Among the 28 countries included in the Larsen (2000) analysis only two had a level of secondary infertility that was higher than the figure for Mozambique.

Bivariate analysis showed that, along with regional variation, both primary and secondary infertility varied considerably according to woman's socio-economic characteristics including education, place of residence, religion, type of marriage and ethnicity. However, when other factors were controlled for, within a multivariate framework, it was found that there was more variation in secondary infertility than is in primary infertility, and that the woman's parity, age at first sexual intercourse and first marriage, number of unions and ethnicity were associated with infertility in Mozambique. There is a very strong negative association between parity and secondary infertility. A significant proportion of women with secondary infertility become infertile at a low parity, many after the first child, suggesting that poor access to adequate health care and skilled assistance during the first pregnancy and delivery are important causes of secondary infertility. The risk of secondary infertility is particularly high among women who began their sexual activity or marriage very young, implying that they may have become pregnant for the first time while physically immature and with an increased risk of having childbirth complications that may lead to subsequent infertility.

Women who have been married twice or more were twice as likely to have both primary and secondary infertility. This implies both that marital instability facilitates the spread of venereal diseases associated with infertility by exposing women to multiple sexual partners, and that infertile women are more likely than fertile women to divorce or to have been abandoned by their husbands.

Regarding ethnicity, both bivariate and multivariate analysis showed that infertility is highest among the matrilineal Macua and lowest among the patrilineal Sena/Ndau. However, in the multivariate analysis, Macua where not different from the other ethnic groups (except Sena/Ndau) in the odds of having primary infertility, implying that the variation in the bivariate analysis was mainly due other factors. These results are not surprising and are consistent with the argument that infertility in sub-Saharan Africa is associated with high sexual freedom, especially the tolerance of premarital and extramarital sexual relations (Caldwell and Caldwell 1983, 2000). The Macua are characterised by almost all the attributes that increase the risk of infertility: early age at first sexual intercourse and first marriage, high marital instability and encouragement of female extramarital sexual relations whereas, in contrast, the Sena/Ndau, despite having the highest prevalence of polygyny, have stable unions and do not tolerate extramarital sexual relationships. It is important to note here that, although it appears to be a matrilineal-patrilineal dichotomy (with the Macua-Sena/Ndau differences), the multivariate results show no difference in the odds of both primary and secondary infertility between the patrilineal Tsonga (reference category) and the matrilineal Lomwe/Chuwabo or the 'mixed descent system' of 'Other local ethnic' background, suggesting important differences within both matrilineality and patrilineality.

Chapter 8

LEVELS AND DIFFERENTIALS OF CONTRACEPTIVE USE

8.1 Introduction

The preceding chapters having discussed nuptiality, postpartum infecundability and infertility, this chapter completes the discussion of the main proximate determinants of fertility by analysing the levels and differentials of contraceptive use. Contraceptive prevalence is one of the most important proximate determinants of fertility, and the fertility declines observed in developing countries have been largely achieved through increased use of contraception (Cohen 1998). In sub-Saharan Africa, however, with the exception of a few countries (e.g. South Africa, Zimbabwe, Botswana and Kenya), contraceptive use remains low, with many researchers attributing such levels of contraceptive use to low levels of socio-economic development and also to cultural and social institutions such as widespread polygyny, horror of barrenness, and belief that births are necessary to reincarnate one's ancestors, which structure high fertility and hinder the implementation of successful family planning programs (Caldwell and Caldwell 1987, 2002).

The effect of many of these factors on contraceptive use in Mozambique is the main focus in this chapter. The next section gives an overview of the family planning program in Mozambique that includes the history, objectives and barriers. Sections 8.3 and 8.4 discuss the levels and socio-economic differentials of contraceptive use applying bivariate and multivariate techniques; Section 8.5 summarises the findings.

8.2 The family planning program in Mozambique

High contraceptive use is often associated with a successful family planning program. Thus, before discussing the levels of contraceptive use, it is worthwhile reviewing the program in Mozambique.

Mozambique's family planning program does not have a long history. The broad policy orientation of the Portuguese administration in relation to population was primarily concentrated on issues related to the quality of the labour force (United Nations 1981:6). The policy with regard to fertility was an adjunct of health policy aimed to ensure the productivity of the indigenous labour force and the reduction of the observed high levels of infertility. Thus, although not clearly explicit, the acceleration of the rate of natural increase and the resulting young age structure were accepted as the desirable consequences of the population policy (United Nations 1981:7). However, although the fertility policy under the Portuguese administration remained pronatalist, with no government support for a family planning program, family planning services were available for the middle and upper classes. Abortion was illegal under the Criminal Code (Decree of 16 September 1886) and any person performing an illegal abortion, and the woman, were subject to imprisonment (United Nations 2001b:149). Only if it was to save the life of the pregnant woman was abortion allowed.

After the country's independence in 1975, policies relevant to individual fertility were formulated: on maternal and child health, conditions of marriage and status of women. As a result, a family planning program was officially adopted in 1978 but it became a national program only in 1980, when the family planning services were made available free of charge through the state-run health centres (United Nations 1981:32; Monreal 1991:i-3; Gaspar et al. 1998:9). The program was and remains an integral part of the Mother and Child Health (MCH) program in the Ministry of Health and its main objective was not to reduce fertility, but to reduce the very high maternal and child mortality rates by promoting child-spacing of at least two years (United Nations 1981; Monreal 1991). The colonial criminal code prohibiting abortion has remained unchanged, but in 1981, concerned about the increase in maternal mortality related to induced abortion, the Ministry of Health issued a decree authorising hospital abortions in case of endangerment of health or contraceptive failure (Hardy et al. 1997:109; United Nations 2001b:149). The interpretation of this decree has become flexible with physicians providing abortion to any woman who signs a document saying she has requested one (Hardy et al. 1997:109). According to Hardy et al. (1997), this flexibility in interpreting the decree is mainly because it is believed that the life of a woman who has decided to have an abortion is always at serious risk in an unsafe abortion.

In order to extend the program to all health units in the country, family planning training has been included in the curricula of the courses for nurses and general medicine technicians since the late 1980s. Traditional midwives, community health workers and health activists were also trained in family planning matters so that they would give information about the family planning program as well as referring women to health units where they could learn more about the methods of birth control (Monreal 1991). This government effort in promoting the family planning program was severely disrupted by civil war because the country's infrastructure was destroyed during the war. For instance, it is estimated that over 700 of the country's 1, 600 health posts were destroyed or closed during the civil war; and rural health personnel were scarce either because they had fled to urban centres or been kidnapped (Cossa et al. 1994:117). The report of the 1987 Reproductive Behaviour of Mozambican Women Survey (RBMWS) noted that the family planning program was the least developed of all the components of MCH programs and that its coverage was fairly reasonable only in Maputo City, where both human resources and health infrastructures were good (Monreal 1991).

The end of the civil war in 1992 and the subsequent economic recovery created an opportunity to strengthen the program. In recognition of the effect of rapid population growth on the economy and general well-being of the population, in 1999 the Mozambican government adopted a National Population Policy that

> seeks to influence the factors that determine demographic trends and behaviour, in order to harmonise the demographic dynamics of the population with other social and economic conditions and with the overall development of the Mozambican society (Republic of Mozambique 1999:2).

The 1999 National Population Policy highlights the intention of the Mozambican government to provide nationwide family planning services to help individuals achieve their reproductive goals. However, poor coverage of health posts and centres has been a potential barrier for universal access to family planning services. In total there were 1,155 health units in 1999 comprising health posts (66%), health centres (31%) and hospitals (3%), corresponding to 9 hospital beds per 10,000 inhabitants (INE 1999c:36-37). Thus, long distances to the nearest contraceptive supplier, especially for Intrauterine Devices that can only be inserted in health centres and hospitals, may frustrate some women who would probably use the services if they were available close to home.

In addition, the shortage of oral contraceptives in many health posts and centres has limited the choice of methods to injections and condoms (McCharen and Mondlane 1999).

Husbands have also been considered a substantial potential barrier to married women using family planning. McCharen and Mondlane (1999) reported that in the southern province of Gaza, many family planning providers had had the experience of angry and threatening husbands coming to the health facility after discovering that their wives were using contraception. The husbands' concern was that family planning encourages prostitution and adultery (Andrade et al. 1998; McCharen and Mondlane 1999). This creates an environment that discourages women from using family planning or leads them to use it in secret as they have little support within the community and family.

8.3 Differentials in contraceptive use

Contraceptive use tends to vary between regions within countries and according to woman's socio-economic characteristics. Many studies in sub-Saharan Africa (Shapiro and Tambashe 1994; Gage 1995; Tawiah 1997; Ekani-Bessala et al. 1998; Odimegwu 1999; Cohen 2000; Lutalo et al. 2000; Babalola et al. 2001; Kimuna and Adamchak 2001) and in other developing countries (Heaton and Forste 1998; Satyavada and Adamchak 2000) have found that education, place of residence, employment status, religion and ethnicity are the most important determinants of contraceptive behaviour. Contraceptive use (especially modern methods) is higher among the educated than uneducated, urban than rural residents and employed than unemployed women. For example, a study in Kinshasa, Democratic Republic of Congo, found that, other things being equal, women who were self-employed and those who were employees had significantly higher predicted probabilities of using any method of contraception than those who were not employed, with the likelihood of contraceptive use being greatest for employees (Shapiro and Tambashe 1994:104).

It has also been noted that in matters related to contraceptive adoption the husband's approval of family planning and the communication between spouses are important (Lasee and Becker 1997; Odimegwu 1999; Feyisetan 2000; Kimuna and Adamchak 2001), especially in sub-Saharan Africa where men often have customary rights over women's reproduction. In such a context, husband-wife communication may represent the first step towards a rational process of fertility decision-making which would lead to approval and adoption of contraceptive use (Lasee and Becker 1997). The widespread practice of polygyny is considered a potential barrier for husband-wife communication about reproductive matters because polygyny weakens the emotional bonds between spouses by widening the age gap between the man and his junior wife or wives (Adongo et al. 1997; Hogan, Berhanu and Hailemariam 1999). Studies in Kenya (Lasee and Becker 1997; Kimuna and Adamchak 2001) and Nigeria (Odimegwu 1999) found that husband's approval of family planning and spousal communication were associated with lower desired family size and higher contraceptive use.

Exposure to mass media, especially to messages about family planning, can also increase contraceptive adoption (Westoff and Rodríguez 1995; Bankole, Rodríguez and Westoff 1996; Westoff and Bankole 1997; Jato et al. 1999; Islam and Hasan 2000). According to Westoff and Bankole (1997:1) exposure to mass media may promote modern ideas of fertility regulation that can be instrumental to other ends, such as socio-economic goals, the health of mothers and children, or considerations of quality of life for children. In their analysis of the relationship between exposure to media messages on family planning and a number of contraceptive indicators (including knowledge, ever and current use of contraception, intention to use among non-users and desire for more children) in six sub-Saharan countries, Burkina Faso, Ghana, Kenya, Madagascar, Namibia and Zambia, Westoff and Bankole (1997) found that women who were exposed to such messages in the media were more likely to use contraception and desire fewer children than women who were not exposed to media messages. They also found a positive association of the intensity of exposure, indicated by number of sources of exposure, with contraceptive behaviour. However, there is a possibility of self-selection that can affect the association between media exposure and contraceptive behaviour, because women who might be oriented toward fertility regulation might also be the same women who would be attracted to the media. Thus, women who practise contraception for reasons not related to media exposure may simply be more likely to hear such messages and report having heard them when asked (Westoff and Rodríguez 1995:27). The effects of these and other factors associated with contraceptive use are discussed below using both bivariate and multivariate techniques.

8.3.1 National and regional levels of contraceptive use

The 1997 DHS was the second post-independence nationally representative survey to collect information on contraceptive use in Mozambique, following the 1987 Reproductive Behaviour of the Mozambican Women Survey (Monreal 1991). The results from these two surveys (Table 8.1) indicate that the percentage of women aged 15-49 currently using modern contraception increased from 11.4 per cent in 1987 to 15.2 per cent in 1997 in urban areas, and declined in rural areas from 3.3 per cent in 1987 to 2.3 per cent in 1997. The apparent decline of contraceptive use for rural women is probably an artefact of poor coverage of rural areas by the 1987 survey. As mentioned in Chapter 2, the sample for this survey was drawn from the relatively small rural areas that were not directly affected by the then continuing civil war. Nevertheless, Table 8.1 shows large urban-rural differences and a large difference between Maputo City and other urban areas. Large differences in contraceptive use between capital cities and elsewhere in the country are common in sub-Saharan Africa and reflect partly the large socio-economic gap between capital cities and the rest of the country (see Lucas and Jhamba 1999, for Kenya, Zambia and Zimbabwe; Kinfu Ashagrea 2001, for Ethiopia).

Table 8.1 Percentage of women 15-49 currently using modern contraceptives by region, Mozambique 1987 and 1997

	1987			Sample	1997			Sample
Region	Total	Rural	Urban	size	Total	Rural	Urban	size
Northern	3.6	2.2	6.8	1545	2.1	0.9	9.6	2465
Central	4.6	2.4	8.0	1189	3.7	2.3	9.4	3317
Southern	9.2	4.4	15.0	2660	9.8	3.8	20.5	2997
Southern (exc. Maputo City)					6.0	3.8	14.3	2427
Maputo City					26.1		26.1	570
Mozambique	7.0	3.3	11.4	5394	5.4	2.3	15.2	8779

Sources: 1987, Monreal (1991:Table 7.5); 1997, computed from 1997 DHS.

Table 8.1 also shows that contraception is highest in the prosperous Southern Region and lowest in the remote Northern Region. Higher contraceptive use in Southern Region than in Northern and Central Regions is largely due to the fact that Southern Region includes Maputo City, where contraceptive use is far higher than anywhere else in the country. For example, 80 per cent of all urban current users of modern contraceptives in Southern Region in 1987 lived in Maputo City (Monreal 1991:7-6), and the 1997 DHS data show that half of all women aged 15-49 who were currently using modern contraceptives in Southern Region lived in Maputo City. However, even if Maputo City is excluded, the Southern Region still has the highest level of contraceptive use, though the difference between regions, especially between Southern and Central Regions, is considerably reduced. This reflects, partly, the influence that Maputo City has in spreading modern reproductive behaviour to other areas of Southern Region: because of improved transport many people travel daily to Maputo City either to sell their agricultural products or to look for jobs (see Arnaldo 1996).

Table 8.2 Percentage of women who know a modern method, have ever used or are currently using a contraceptive method, by region and marital status, Mozambique 1997

Region	% know modern method	% ever used: Any method	% ever used: Traditional method	% ever used: Modern method	% currently using: Any method	% currently using: Traditional method	% currently using: Modern method	No. of cases
All women								
Northern	46.3	7.9	1.5	6.3	2.8	0.7	2.1	2243
Central	59.4	11.2	1.1	10.1	4.1	0.4	3.7	2999
Southern	75.7	22.9	1.1	21.8	10.8	1.0	9.8	3537
Mozambique	61.3	14.2	1.2	13.0	6.0	0.7	5.4	8779
Married women								
Northern	45.4	7.5	1.7	5.8	2.9	0.8	2.1	1849
Central	58.8	11.4	1.2	10.3	4.4	0.2	4.1	2277
Southern	78.9	22.7	0.8	21.9	10.2	0.6	9.6	2134
Mozambique	60.4	13.4	1.2	12.2	5.6	0.5	5.1	6260
Unmarried ever-sexually active women								
Northern	50.7	12.1	0.9	11.2	2.8	0.0	2.8	312
Central	61.7	15.1	1.4	13.7	4.8	1.4	3.4	473
Southern	70.3	32.2	2.2	30.0	16.8	2.2	14.6	1042
Mozambique	64.0	22.8	1.7	21.1	10.2	1.5	8.7	1827

Source: Computed from 1997 DHS.

Table 8.2 shows the percentages of women who know a modern method, have ever used and are currently using contraception by region and type of method, computed from the 1997 DHS. The reported traditional methods include periodic abstinence, withdrawal and 'other' whereas the modern methods include pill, intrauterine devices (IUD), injection (Depo-Provera), condom and female sterilisation. In general, as one would expect, there is a fairly strong relationship between the knowledge of contraception and its use. The Sourthern Region with the highest proportion of women who know a modern contraceptive method also has the highest proportion of ever- and current users. However, the table shows a wide gap between knowledge and use of contraception. For example, while over 60 per cent of married women reported knowing a modern method, only 12 per cent have ever used and 5 per cent are currently using one. A wide gap between knowledge and use of contraception suggests that women have high family-size preference or lack access to contraceptive methods or information about their correct use. Indeed, 46 per cent of non-user women who have ever had sexual intercourse reported not using contraception because of wanting to have more children, while 17.5 per cent did not know any method or any source and 14.2 per cent (11.5% of women themselves and 2.7% of husbands/partners) opposed birth control. It is interesting to note that there is more opposition to contraception from respondents themselves than from their husbands or partners, suggesting that many women may lack correct information about contraceptive methods. For example, some participants in focus group discussions in Inhambane province believed that the use of modern contraceptive methods, especially the pill, could 'accumulate' in the woman's uterus leaving her infertile. Agadjanian (1998c:6) reported that in Maputo City many women refused to have an IUD inserted, fearing that a foreign object in their uterus would cause physical damage or injure the man during sexual intercourse.

In addition, 22 per cent of women are in unmet need[18] of contraception for both spacing (17%) and limiting (5%) childbearing. According to Caetano and Arnaldo (2002) spacers are more likely to be young, with few children, be of high or low socio-economic status, and live in both rural and urban areas; while limiters are more likely to be older, rural, illiterate and have at least five surviving children. They also identified a category of unmarried adolescents who may be in need of contraception to delay the onset of childbearing that would see them drop out of school and end up as housewives.

Table 8.2 also shows that women who use contraception are more likely to use modern than traditional methods. It is interesting to note that the use of both traditional and modern methods of contraception is higher for unmarried ever-sexually active women than for married women. This suggests that not being in a union, perhaps an indication of poor conditions for raising a child, motivates women to seek contraception, especially never-married women who represent 91 per cent of unmarried ever-sexually active women; for them the use of contraception may prevent unwanted premarital pregnancy that would force them to leave school and enter marriage or motherhood earlier than they would have chosen.

The distribution of current users of contraception by method (Figure 8.1) shows that injections are the single most preferred method of contraception among married women and pills among unmarried women. Among married women injections (41% of current users) and the pill (26% of current users) account for more than 60 per cent of contraceptive use, and for unmarried women the corresponding proportion is 58 per cent, 31 per cent for the pill and 27 per cent for injections. The remaining modern methods (IUD, condom and female sterilisation) are preferred by between 20 and 30 per cent of current contraceptive users. The higher proportion of injection users among married

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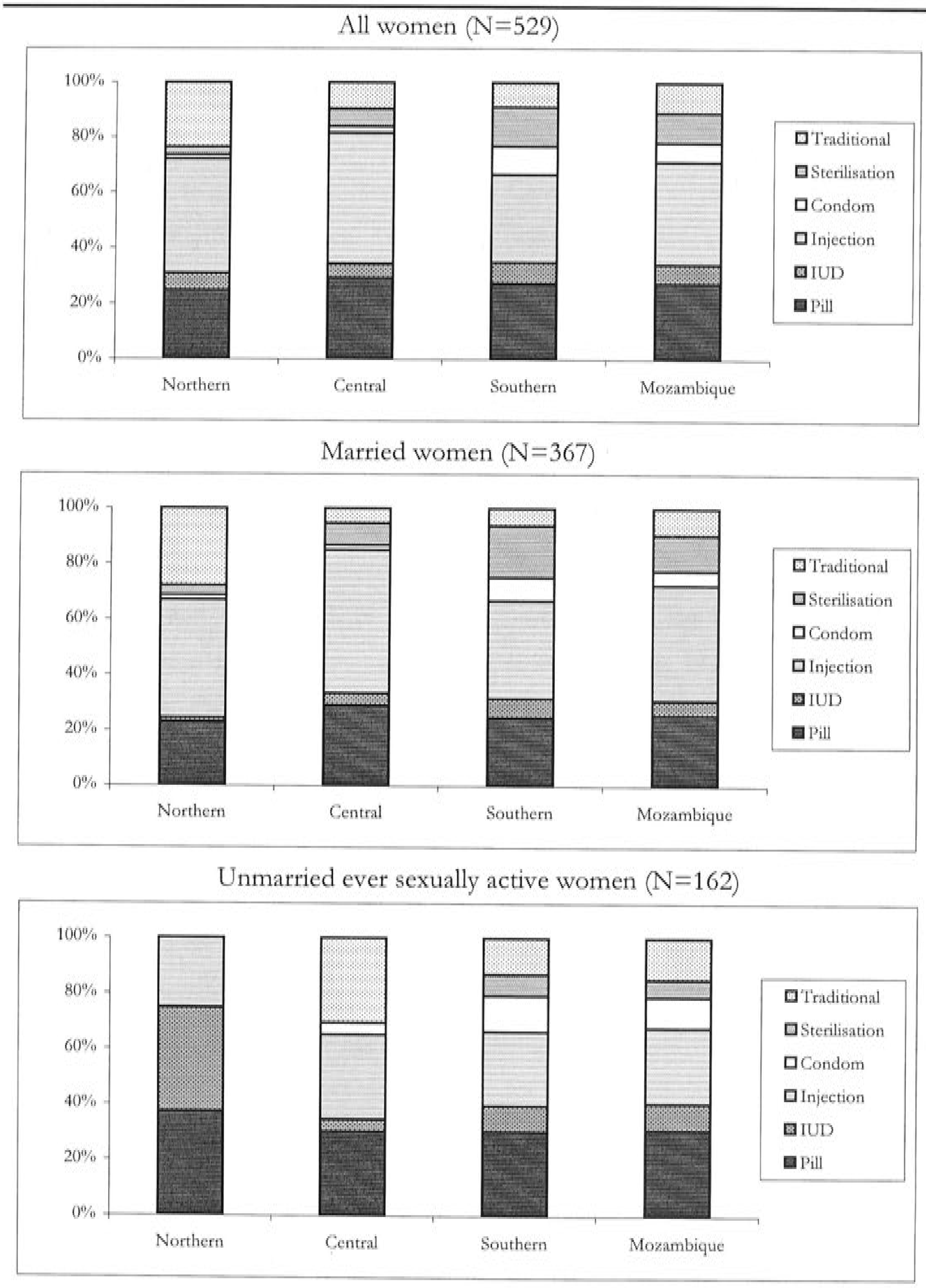
[18] The proportion of fecund women who are neither pregnant nor postpartum amenorrhoeic and who are not using any method of contraception.

women is partly due to a higher proportion of unmarried women who do not qualify for injection. Officially, injection was restricted to older and high-parity women with at least four children, because it is believed women may find it difficult to conceive later because of the lingering effect of Depo-Provera (Agadjanian 1998c:7). The higher preference for injections and pills over the other modern methods may be due to limited choice related to the unavailability of other methods in many health centres, especially in rural areas. A study in the southern province of Gaza (McCharen and Mondlane 1999) found that in many health posts and centres the choice of modern contraceptives was limited to injections and condoms. Since many women, especially married women, refuse condoms because they are thought to 'reduce the pleasure' (see Firmino et al. 1999), the only remaining viable option is injection. Women may also prefer the injection over other methods because it is easier to hide its use from husbands, relatives and neighbours if these people do not approve of the practice of family planning (see Luck et al. 2000, on the Gambia).

Figure 8.1 also shows that the use of condoms is highest in Southern Region and among unmarried, especially never-married, women and is almost non-existent in Northern Region. This regional pattern in condom use is probably due to difference in age at marriage. Since marriage is early in Northern Region the proportion of women 15-49 who are never married is negligible, while in Southern Region, because marriage is late, there is a significant proportion of women 15-49 who have never been married. Regional differences are also noticeable in relation to the other methods. Female sterilisation is more common in Southern Region than in Central or Northern Regions, reflecting, perhaps, regional differences in access to health facilities that can perform the operation. Interestingly, in Northern Region a high proportion of unmarried women users prefer IUDs and about a quarter of married current-user women use traditional methods, in contrast to Southern and Central Regions where the use of both methods is fairly moderate. However, part of the variation may be due to small numbers.

Figure 8.1 Percentage distribution of current users of contraceptives by method used and region, Mozambique 1997



Source: Computed from the 1997 DHS.

8.3.2 Education and contraceptive use

Studies in sub-Saharan Africa (Shapiro and Tambashe 1994; Ainsworth, Beegle and Nyamete 1996; Tawiah 1997; Odimegwu 1999; Cohen 2000; Kimuna and Adamchak 2001) and in other developing countries (Castro Martín 1995; Jejeebhoy 1995; Heaton and Forste 1998) show that the better educated a woman is, the more likely she is to practise contraception. Differentials in contraceptive use have been observed between uneducated women, those with primary education, and women with secondary or higher education. Education is believed to influence women's decision-making in the household and increase their autonomy in many ways. According to Castro Martín's (1995:194) analysis of DHS data from 26 countries of Africa, Asia and Latin America, better-educated women are more likely than others to desire smaller families and hence have a stronger motivation to practise contraception. By enhancing women's position within the household authority structure, education also improves women's control over reproductive choices (Castro Martín 1995; Jejeebhoy 1995). Because the information about the availability, correct use, side-effects and costs may be less difficult and costly for educated women to assimilate, they are better informed about contraceptive options and sources, and are more likely to use effective methods than less educated women (Castro Martín 1995; Ainsworth et al. 1996; Heaton and Forste 1998). Also, educated women are more exposed to family planning messages through the mass media (Bankole et al. 1996; Westoff and Bankole 1997; Jato et al. 1999), and feel more comfortable discussing family planning issues with their husbands or partners (Lasee and Becker 1997; Kimuna and Adamchak 2001), factors that are positively related with contraceptive use.

Table 8.3 presents the proportion of women who have ever used and those who are currently using a contraceptive method by educational level. As expected, contraceptive use increases with woman's education. For example, the contraceptive prevalence rate, that is, the proportion of women who are currently using any method of contraception among all women aged 15-49, ranges from 3.0 per cent for uneducated women to 33.7 per cent for women with secondary education or higher. There is a preference for modern over traditional methods at all levels of education. Educational differences in contraceptive prevalence rate are smaller between uneducated and women with primary education (2.9:6.6 for current use of any method) than between women with primary education and those with secondary education or higher (6.6:30.0 for current use of any method). This may not be surprising since differentials in contraceptive use by woman's education are expected to be largest in societies at the initial stage of fertility decline, where the better-educated women emerge as forerunners in the adoption of family planning (Castro Martín 1995).

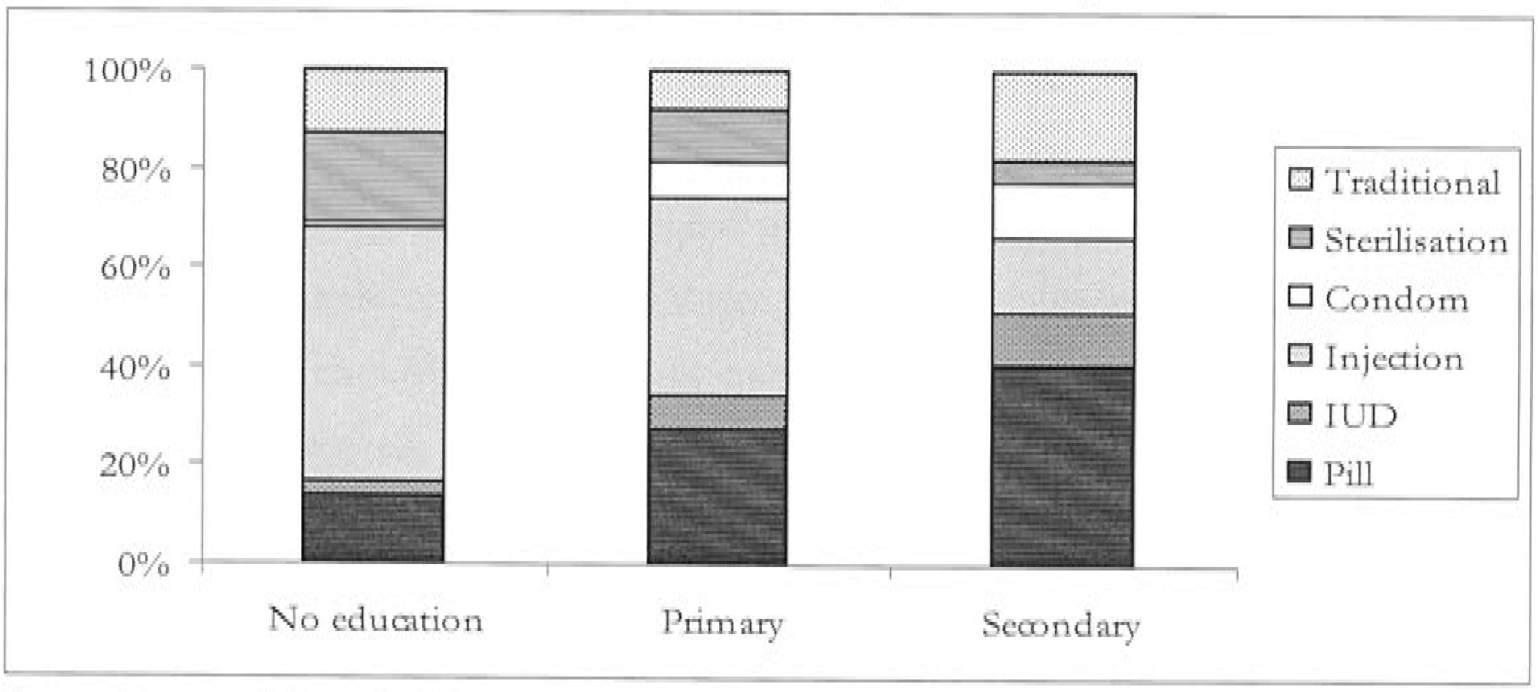
Table 8.3 Percentage of women 15-49 who have ever used or are currently using a contraceptive method, by educational level, Mozambique 1997

	% ever used			% currently using			No.
Educational level	Any method	Traditional method	Modern method	Any method	Traditional method	Modern method	of cases
No education	6.9	1.2	5.7	2.9	0.4	2.5	3434
Primary	16.9	1.1	15.8	6.6	0.5	6.1	4844
Secondary +	54.2	2.9	51.3	30.0	5.5	24.5	501

Source: Computed from 1997 DHS.

In most societies, one would expect the reliance on modern methods of contraception to increase significantly with education, and the use of traditional methods to decline as education increases. Table 8.3 confirms this expectation only in relation to the use of modern methods. As shown in Figure 8.2 the use of both modern and traditional contraceptive methods is highest among women with secondary or higher education. This pattern has also been observed in other developing countries (see Castro Martín 1995).

Figure 8.2 Percentage distribution of current users of contraceptives by method used and educational level, women 15-49, Mozambique 1997



Source: Computed from 1997 DHS.

Figure 8.2 shows that for modern contraceptive methods, the use of injection and female sterilisation decreases with education whereas that of the pill, IUD and condom increases as the woman's level of education also increases. Injection may be a convenient contraceptive method for uneducated women. Unlike the pill, for example, which needs to be taken daily and requires sustained motivation or medical monitoring, an injection is received only once every three months. The higher prevalence of sterilisation among uneducated women than the educated is partly related to the fact that educated women are younger than the uneducated and hence are less likely to have attained the desired family size in order to use an irreversible method. The increase in condom, IUD and pill use with educational level may be due to differences in age composition between educated and uneducated women, as well as a greater ability of educated than uneducated women to take the pill correctly. Also, the fear of having a 'strange object' in their bodies, mentioned earlier (Section 8.3.1), may be stronger among uneducated than educated women, since the latter are likely to have better knowledge about birth control methods.

8.3.4 Religion and contraceptive use

Religious differences in contraceptive use can reflect socio-economic differences of the members, differences in theological tenets about family size and acceptable methods of birth control (Goldscheider and Mosher 1988, 1991), or differences in religious congregations' social environment and social composition (Agadjanian 2001b). According to the first view, also known as the 'characteristics hypothesis' (see also Chapter 4), religious differences, when they exist, are largely artefacts of socio-economic differences between members of the religious groups. Thus, what may seem to be a religious influence often reflects the fact that the members of any religious group are typically concentrated in very few places in the social structure (Mosher and Hendershot 1984:672).

The second view suggests that theological tenets about family size ideals and the type of contraceptives that are acceptable may differ according to religious affiliation. For instance, the Catholic Church advocates that only traditional methods (e.g. periodic abstinence and rhythm) are the morally acceptable way of practising responsible procreation, and that other ways of birth control like abortion and modern contraceptive methods are immoral, dehumanising and contrary to God's law (Adegbola 1988; Bacani 1992). Since Protestants have no proscriptions against modern contraception (Johnson 1993:87) and Islam presents few obstacles to contraception, except for abortion and sterilisation (Adegbola 1988; Omran 1992; Kulczycki 1997), this view would predict contraceptive use to be lower among Catholics than Protestants and Muslims.

The third view, proposed by Agadjanian (2001b), suggests that religious differences in contraceptive use can also be explained by differences in congregations' social environment and social composition in which the members interact with each other. According to Agadjanian (2001b) social interactions within religious congregations which are heterogeneous in socio-economic characteristics that affect contraceptive use have a positive effect on the adoption of contraception, as they facilitate the spread of contraceptive innovations from higher-status early adopters to lower-status segments of members. Thus, contraceptive use should be highest among socially heterogeneous religions such as the Catholics and mainstream Protestants, low among smaller and socially homogeneous congregations, and lowest among women with no religion as they have fewer opportunities to interact with other women. However, the study by Rutenberg and Watkins (1997) in Kenya shows that women are more likely to talk about contraception with women of similar socio-economic status than with women of either higher or lower status.

The evidence suggests that the effect of religious affiliation on contraceptive use in sub-Saharan Africa varies from country to country. Studies in Uganda (Agyei and Migadde 1995; Lutalo et al. 2000) and Ghana (Tawiah 1997) found that religion did not have any effect on contraceptive use, whereas in Sierra Leone (Amin 1998), Cameroon (Babalola et al. 2001), Nigeria (Odimegwu 1999) and Kinshasa, Democratic Republic of Congo (Shapiro and Tambashe 1994), religion had considerable influence on contraceptive use. In Sierra Leone, Cameroon and Nigeria, Christian women were more likely than other women to use contraception, and in Kinshasa, Shapiro and Tambashe (1994:104) found that all non-Catholic religious groups had slightly higher rates of contraceptive prevalence than Catholics, while those women indicating no religious affiliation reported a significantly lower likelihood of practising contraception.

Table 8.4 Percentage of women 15-49 who have ever used or are currently using a contraceptive method, by religious affiliation, Mozambique 1997

Religious affiliation	% ever used: Any method	% ever used: Traditional method	% ever used: Modern method	% currently using: Any method	% currently using: Traditional method	% currently using: Modern method	No. of cases
Catholic	17.0	1.4	15.6	7.5	0.9	6.6	2404
Protestant	20.6	1.0	19.6	8.7	0.6	8.1	1318
Muslim	10.9	1.5	9.4	4.3	1.0	3.3	1475
Zionist	14.3	0.9	13.3	6.4	0.5	6.0	1033
Other religion	15.2	1.2	14.0	7.9	0.9	7.1	618
No religion	8.3	0.9	7.4	3.1	0.2	2.9	1679

Source: Computed from 1997 DHS.

Table 8.4 shows that in Mozambique contraceptive use varies substantially according to religious affiliation. The lowest contraceptive prevalence rates are found among the Muslims and women with no religion and the highest among the Protestants, with

Catholics, Zionists and women of other religions not far behind. It is interesting to note that despite their well known stand against modern contraception the Catholics have the third highest contraceptive prevalence rate after Protestants and women of 'other' religion, and the Catholic rate is twice as high as that for Muslims who are thought to be more sympathetic to contraception. Also, the use of traditional methods, the only methods allowed by the Catholic Church, is slightly higher for Muslims than Catholics.

Among non-current users, more Muslims (59%) and Catholics (52%) than women of the other religious categories (Protestant, Zionist, Other religion and No religion) reported not using contraception because they want more children. The Zionists (15%) have the highest proportion of non-users who oppose contraception, while the Muslims (7%), who have the lowest contraceptive prevalence rate, offer the weakest opposition to family planning. Religious prohibition as the reason for not using contraception was most reported by women of 'Other' religion (3.2%) and least reported by Muslims (0.2%). Only 1 per cent of Catholic non-users gave religion as a reason for their behaviour, which is rather surprising because the Catholic Church is the strongest opponent of modern contraceptive methods. The extent to which these and other factors explain the pattern shown in Table 8.3 is examined by a multivariate analysis in Section 8.4.

8.3.5 Ethnicity and contraceptive use

The 'characteristics hypothesis' and the 'norms hypothesis' used as explanatory hypotheses of religious differences in contraceptive use described in the previous section are also applicable in explaining ethnic differences in contraceptive use. Addai (1999) tested these hypotheses by examining differentials in contraceptive use in six ethnic groups, Ga-Adangbe, Twi, Fante/other Akans, Ewe, Guan/others and Mole-Dagbani, in Ghana and could not reject the characteristics hypothesis, although the Fante/other Akans, even after socio-economic characteristics had been accounted for, continued to be significantly associated with higher contraceptive use. Similarly, Tawiah (1997), also in Ghana, and Shapiro and Tambashe (1994) in Kinshasa, did not find any significant effect of ethnicity on contraceptive use after other socio-economic characteristics had been controlled. However, in Uganda (Agyei and Migadde 1995) and Sierra Leone (Amin 1998) ethnicity was found to have a significant effect on contraceptive use.

To assess the effect of ethnicity on contraceptive use in Mozambique, the proportion of ever-users and current-users of contraception was computed by woman's ethnic affiliation and type of method, traditional or modern (Table 8.5). As expected, given their high socio-economic status, women of Portuguese/foreigner background have the highest proportion of ever and current use of contraception, and the gap between them and women of the other groups is large. Considering only the local ethnic groups, that is, excluding those of Portuguese/foreigner background, Table 8.5 shows that Tsonga background is associated with the highest contraceptive prevalence rate whereas Lomwe/Chuwabo and Macua backgrounds are associated with the lowest contraceptive use. This is also as expected given the difference in socio-economic status between women of these ethnic groups (see Chapter 1). Surprisingly, however, further analysis shows that women of Lomwe/Chuwabo background have the highest proportion of women who approve of family planning (55%). Among the remaining ethnic groups the proportion of women who approved of family planning was between 37 and 49 per cent. Regarding the discussion of family planning issues with husbands or partners, the pattern is consistent with that in Table 8.5 with the Tsonga women being the most likely to have discussed family planning with their husband or partner (34%) and the Lomwe/Chuwabo the least likely to have done so (8%).

Table 8.5 Percentage of women 15-49 who have ever used or are currently using a contraceptive method, by ethnic affiliation, Mozambique 1997

	% ever used			% currently using			No.
Ethnic background	Any method	Traditional method	Modern method	Any method	Traditional method	Modern method	of cases
Tsonga	19.6	1.1	18.6	9.5	1.1	8.4	3177
Sena/Ndau	10.8	1.6	9.2	3.8	0.4	3.4	2385
Lomwe/Chuwabo	8.8	0.9	7.9	1.8	0.0	1.8	271
Macua	7.7	1.3	6.4	2.8	0.5	2.3	2049
Other local	15.8	0.8	15.0	5.5	0.0	5.5	405
Portuguese/foreigner	53.2	1.6	51.6	26.0	2.6	23.5	375

Source: Computed from 1997 DHS.

Among the non-current users of contraception, Macua have the highest proportion of women who were not using contraception because they want more children (63%), and the Sena/Ndau have the lowest (28%). Despite having the highest contraceptive prevalence rate, the Tsonga have the second highest proportion (17%), after the 'Other' local ethnic group (18%), of women who are not using contraception because they oppose it. Only 6 per cent of Macua and 9 per cent of Lomwe/Chuwabo oppose contraception. In the next section, the independent effects of these and other socio-economic factors on contraceptive use are discussed on the basis of results from a multivariate analysis.

8.4 The determinants of contraception: a multivariate analysis

The bivariate analysis performed in the preceding sections has shown that the use of contraception varies with woman's socio-economic characteristics, and that residence in Southern Region, secondary education, Protestant religion and Portuguese/foreign and Tsonga ethnic background are associated with higher use of contraceptives. This section applies multivariate techniques to explore the net effect of each woman's socio-economic characteristics on three indicators of contraceptive use: ever-use, current-use and the intention to use contraception in the future.

8.4.1 Ever-use and current-use of contraception

This analysis includes all women who have ever been sexually active, excluding those who have never had sexual intercourse. The two dependent variables 'ever-use' and 'current-use' of contraception were recoded into three categories: 1 'Only used or is using a traditional method', 2 'Have used or is using a modern method' and 3 'Have never used or is not using any method'. Since the dependent variable has three categories, a multinomial logistic regression model was fitted. The multinomial logistic regression model is the logistic regression model adapted to the case of a dependent variable with three or more categories (Halli and Rao 1992; Retherford and Choe 1993). When the dependent variable is trichotomous, the multinomial logistic regression model produces two sets of coefficients: the first one is for the odds of being in the first category against the third, and the second one is for the odds of being in the second category against the third. For more detail of multinomial logistic regression see Appendix A.

The independent variables include woman's and husband's education, employment status, religion, ethnicity, place of residence, radio ownership, age, exposure to family planning messages from media (radio, television and print), marital status, fertility preference, number of living children, husband-wife communication about family planning, husband's and woman's approval of family planning, and region.

The results of the multivariate analysis are presented for all ever sexually active women and also separately for women who are currently in a union. The model could not be fitted separately for unmarried ever sexually active women due to sample-size constraints. Tables 8.6 and Appendix Table G8.1 show the results for ever-use of contraception for all ever-sexually active women and currently married women, respectively, and Tables 8.7 and Appendix Table G8.2 the results for current-use of contraception for all ever sexually active women and currently married women, respectively. Model I shows the odds ratios of ever-use or current-use of a traditional method against never-use or non-current-use of any method, Model II the odds ratios of ever-use or current-use of a modern method against never-use or non-current-use of any method, and Model III the odds ratios of ever-use or current-use of a modern method against ever-use or current-use of a traditional method among women who have ever used or are currently using a contraceptive method.

In general, the results show that there are smaller differences in socio-economic characteristics between women who used or use traditional methods and those who never used or are not using any method (Model I) than between women who used or are using modern methods and those who never or are not using any method (Model II). Model III shows that most socio-economic characteristics have some influence on the women's choice between modern and traditional methods of contraception. The absence of statistical significance in most odds ratios in Model III may be due to the small number of women who have used or are currently using contraception, especially the users of traditional methods.

Consistent with the bivariate analysis and findings elsewhere in sub-Saharan Africa (e.g. Shapiro and Tambashe 1994; Tawiah 1997), woman's education increases the use of both traditional and modern contraceptive methods. For instance, Models I and II in Table 8.7 show that a woman with secondary or higher education is 5.4 times more likely to be currently using a traditional method, and 4.5 time more likely to be using a modern method than one with no education. The odds ratios presented in Tables 8.6 and 8.7, and those in Appendix Tables G8.1 and G8.2, also show that for the use of a traditional method (Model I) only having secondary education or higher is significantly associated with a higher likelihood of using contraception, and that for married women, even a woman's secondary education does not increase her likelihood of using a traditional method of contraception compared with having no education. The education of the husband does not have any effect on the likelihood of using traditional methods, and only women whose husbands have attained secondary or higher education are more likely to use contraception than those whose husbands have no education.

Education also influences women's choice between modern and traditional methods of contraception. Model III shows that educated women (primary and secondary) are more likely to prefer modern to traditional methods than women with no education, although the odds ratio for secondary education is not statistically significant at the 5 per cent level, probably because of the small number of women with secondary education. This is not surprising since education may break down the traditional practices, including traditional forms of birth control, and exposes women to modern and more effective methods of contraception (Mahmud and Johnston 1994).

Unpaid work and self-employment are negatively associated with contraceptive use whereas paid employment has a positive effect. These associations are statistically weaker for traditional than for modern methods and for current-use than ever-use reflecting, partly, small numbers of users of traditional methods and current users. The negative effect of both unpaid work and self-employment on contraceptive use may reflect high family-size desire among women in these two categories[19], since both activities usually take place at home or nearby and do not conflict with childcare. Self-employed women may also represent a least Westernised segment of women, thus less exposed to modern contraceptive technology (Agadjanian 1998a). The results also show that there are some differences in the likelihood of using modern or traditional methods between unpaid worker and self-employed women. Unpaid workers who have used or are using contraception are more likely to use modern methods than the reference category, whereas for self-employed women the odds of using modern over traditional methods are not significantly different from the reference category, or else show preference for traditional methods (see Model III in Tables 8.6 and 8.7).

[19] The 1997 DHS shows that women in these two categories have the highest proportion (47%) desiring six or more children.

Table 8.6 Odds ratios from multinomial logistic regression analysis of having ever used contraception by socio-economic characteristics among ever sexually active women 15-49, Mozambique 1997

Socio-economic characteristics	Odds ratio		
	Model I	Model II	Model III
	Traditional vs no method	Modern vs no method	Modern vs traditional
Education			
No education	1.000	1.000	1.000
Primary	0.855	2.351 ***	2.750 ***
Secondary or higher	4.234 ***	7.898 ***	1.865
Employment status			
Not working ®	1.000	1.000	1.000
Unpaid worker	0.113 ***	0.490 ***	4.327 **
Self-employed	0.711	0.682 ***	0.958
Paid worker	1.100	1.364 *	1.240
Religion			
Catholic ®	1.000	1.000	1.000
Protestant	0.923	0.903	0.977
Muslim	0.850	0.811	0.953
Zionist	0.485	0.550 ***	1.149
Other religion	0.625	0.698 *	1.117
No religion	0.645	0.572 ***	0.887
Ethnicity			
Tsonga ®	1.000	1.000	1.000
Sena/Ndau	1.876	1.338	0.713
Lomwe/Chuwabo	0.241	0.668	2.772
Macua	0.894	0.814	0.910
Other local	0.687	1.643	2.390
Portuguese/foreigner	0.839	1.798 ***	2.144
Place of residence			
Urban ®	1.000	1.000	1.000
Rural	0.590 *	0.461 ***	0.781
Age	0.998	0.995	0.997
Household owns radio			
Yes®	1.000	1.000	1.000
No	0.929	0.739 ***	0.796
Exposure to FP from media			
Exposed to none ®	1.000	1.000	1.000
Exposed to one medium	1.408	1.528 ***	1.086
Exposed to two media	1.647	1.542 **	0.936
Exposed to all three media	1.827	1.533 *	0.839

Table 8.6 Continued...

Socio-economic characteristics	Odds ratio Model I Traditional vs no method	 Model II Modern vs no method	 Model III Modern vs Traditional
Marital status			
Never married	1.787 *	1.320 **	0.738
Monogamous®	1.000	1.000	1.000
Polygynous senior	1.270	0.840	0.662
Polygynous junior	1.212	0.676 **	0.558 *
Divorced/widow	1.836	0.726	0.395
Fertility preference			
Have another ®	1.000	1.000	1.000
Undecided	1.595	1.134	0.711
No more	1.083	1.526 ***	1.409
Sterilised/infecund	1.235	1.876 ***	1.518
Number of surviving children			
None ®	1.000	1.000	1.000
1-2	1.505	2.635 ***	1.751
3-4	2.599 **	7.462 ***	2.871 **
5 +	4.869 ***	9.200 ***	1.890
Respondent approval of FP			
Disapproves ®	1.000	1.000	1.000
Approves	4.789 ***	8.844 ***	1.847 *
Don't know	0.731	1.148	1.570
Region			
Northern	1.696	0.430 **	0.254 *
Central	0.678	0.407 ***	0.600
Southern®	1.000	1.000	1.000
Constant	-4.81 ***	-3.68 ***	1.13
- 2 Log likelihood		5440.06	
Chi-square		2869.99***	
No. of cases		7315	

Note: ® Reference category; *p≤0.05; **p≤0.01; ***p≤0.001.
Source: Computed from 1997 DHS.

Religion influences only the likelihood of using modern contraceptive methods, and the pattern of relationship seems consistent with Agadjanian's (2001b) 'congregation social environment' hypothesis. There are no significant differences in the likelihood of using contraception between Catholics (the reference category) and Protestants or Muslims, whereas women who profess Zionism or other religions and those who have no religion are less likely to use contraception than Catholic women. Gregson at al.'s (1999) analysis in rural Zimbabwe also found that Zionists had lower contraceptive use than other churches. According to Agadjanian's (2001b) hypothesis this may be because small religious congregations like Zionism offer fewer opportunities for innovation as they tend to be socially homogeneous compared with large congregations like Catholics or mainstream Protestants, where social diversity encourages the exchange of diverse reproduction-related ideas and experiences that may facilitate the spread of contraceptive innovations from higher-status early adopters to lower-status members. For women with no religion, low contraceptive use reflects even fewer opportunities to interact with other women.

In relation to ethnicity, with the exception of women of Portuguese/foreigner background who are more likely to use modern contraception than the Tsonga, there are no significant differences in the likelihood of using contraception between all the remaining ethnic groups and the reference category. These findings are in support of the 'characteristics hypothesis' which postulates that ethnic differences in contraceptive use are explained by socio-economic differences between members of different ethnic groups. In Ghana (Tawiah 1997; Addai 1999) and Kinshasa (Shapiro and Tambashe 1994) the effect of ethnicity was also found not to be significant once socio-economic characteristics were controlled. Model III shows that apart from married women of Sena/Ndau and 'Other' ethnic background who are more likely than the Tsonga to prefer modern to traditional methods (Appendix Tables G8.1 and G8.2), there are no significant differences between the remaining ethnic groups and the Tsonga in the likelihood of using modern rather than traditional methods.

Women living in urban areas are more likely to use both traditional and modern methods of contraception. The results on modern contraception were expected since exposure to ideas about contraception, and access to family planning and health facilities, are higher in urban than in rural areas, but the finding of higher use of traditional methods in urban than in rural areas is rather surprising. However, such a finding may not be totally unexpected in sub-Saharan Africa where, like modern methods, traditional methods of contraception are often better known and more widely used in urban than in rural areas (Agadjanian 1998c). A study in the Democratic Republic of Congo (Bertrand et al. 1985:Table 3) found that the proportion of women using withdrawal and rhythm was higher in urban than in rural areas. The 1987 survey reported a slightly higher proportion of women using traditional methods in urban than in rural areas (Monreal 1991:7.3). A qualitative study in Maputo City (Agadjanian 1998c) also found that traditional methods were popular among Maputo's women, especially among low-status women living on the city's periphery.

Table 8.7 Odds ratios from multinomial logistic regression analysis of currently using contraception by socio-economic characteristics among all ever sexually active women 15-49, Mozambique 1997

Socio-economic characteristics	Odds ratio		
	Model I	Model II	Model III
	Traditional vs no method	Modern vs no method	Modern vs traditional
Education			
No education	1.000	1.000	1.000
Primary	1.023	2.052 ***	2.006 *
Secondary or higher	5.384 ***	4.462 ***	0.829
Employment status			
Not working ®	1.000	1.000	1.000
Unpaid worker	0.588	0.510 **	0.868
Self-employed/informal sector	1.571	0.737 *	0.469 *
Paid worker/formal sector	2.030 *	1.247	0.614
Religion			
Catholic ®	1.000	1.000	1.000
Protestant	0.715	0.926	1.294
Muslim	0.942	0.964	1.023
Zionist	0.496	0.645 *	1.300
Other religion	0.635	0.603 *	0.949
No religion	0.567	0.631 **	1.113
Ethnicity			
Tsonga ®	1.000	1.000	1.000
Sena/Ndau	0.929	1.232	1.327
Lomwe/Chuwabo	-	0.456	-
Macua	0.493	0.828	1.679
Other local	0.377	1.611	4.276
Portuguese/foreigner	1.060	1.408	1.328
Place of residence			
Urban ®	1.000	1.000	1.000
Rural	0.506 *	0.558 ***	1.102
Age	1.005	1.004	0.999
Household owns radio			
Yes®	1.000	1.000	1.000
No	1.043	0.919	0.882
Exposure to FP from media			
Exposed to none ®	1.000	1.000	1.000
Exposed to one medium	0.734	1.888 ***	2.572 **
Exposed to two media	0.983	1.578 **	1.606
Exposed to all three media	1.230	1.587 *	1.291

Table 8.7 Continued...

Socio-economic characteristics	Odds ratio		
	Model I	Model II	Model III
	Traditional vs no method	Modern vs no method	Modern vs traditional
Marital status			
Never married	1.681	1.409 **	0.838
Monogamous®	1.000	1.000	1.000
Polygynous senior	1.265	0.561 *	0.444
Polygynous junior	1.052	0.647 *	0.616
Divorced/widow	3.120	0.852	0.273 *
Fertility preference			
Have another ®	1.000	1.000	1.000
Undecided	1.252	1.104	0.882
No more	1.273	1.463 **	1.149
Sterilised/infecund	0.174	4.038 ***	23.180 **
Number of surviving children			
None ®	1.000	1.000	1.000
1-2	0.639	2.351 ***	3.677 **
3-4	1.591	4.796 ***	3.014 *
5 +	1.880	7.113 ***	3.783 *
Respondent approval of FP			
Disapproves ®	1.000	1.000	1.000
Approves	27.005 ***	17.721 ***	0.656
Don't know	0.000	2.360 *	0.000
Region			
Northern	1.965	0.403 **	0.205 **
Central	0.771	0.415 **	0.538
Southern®	1.000	1.000	1.000
Constant	-6.89621 ***	-5.87 ***	1.02
- 2 Log likelihood		3474.90	
Chi-square		1717.99***	
No. of cases		7315	

Notes: ® Reference category; (-) no cases in the category; *p≤0.05; **p≤0.01; ***p≤0.001.
Source: Computed from 1997 DHS.

Consistent with studies elsewhere in sub-Saharan Africa (Westoff and Bankole 1997; Jato et al. 1999; Cohen 2000; Babalola et al. 2001) the exposure to mass media family planning messages is positively associated with modern contraceptive use. For instance, Model II in Tables 8.6 and 8.7 shows that women exposed to at least one media source of family planning messages are over 1.5 times as likely as women not exposed to any of the three sources of contraceptive information, radio, television and printed media, to use modern contraception. In contrast to findings by Jato et al. (1999) in Tanzania, and Westoff and Bankole (1997) in six sub-Saharan countries, exposure to two or three sources does not greatly increase the likelihood of using modern contraception compared to being exposed to one source of family planning messages. Also, the exposure to media messages of family planning seems to have no effect on the contraceptive behaviour of married women (see Appendix Tables G8.1 and G8.2), reflecting, perhaps, the fact that most family planning messages in the Mozambican media do not emphasise birth control within marriage. Rather, they are more directed to HIV/AIDS prevention, encouraging fidelity to the partner and use of condoms when engaging in casual sexual intercourse.

Never-married women are more likely to use both traditional and modern methods of contraception than women married to monogamous husbands, while polygynously married women, especially junior wives, are less likely to use modern contraception than women in monogamous unions. Interestingly, junior wives of polygynous husbands and divorcees or widows who have used or are using contraception are more likely to prefer traditional to modern methods than women in monogamous marriages. This seems consistent with Agadjanian's (1998c) findings that in Maputo City women who were in polygynous marriages were among the most likely users of traditional methods of contraception. For divorced women and widows a resort to traditional methods may offer more privacy than modern methods, since it may not be appropriate for these women to be seen at a family planning clinic while it is socially known they have no formal partners.

Women who want no more children are more likely to use contraception than those who want to have more, while there is no significant difference in the odds of using contraception between those who are undecided and those who want to have more children. This suggests that women look for contraception only when they have attained their desired family size. In support of this is the strong positive effect of the number of surviving children on the odds of using both traditional and modern methods of contraception. This pattern implies, therefore, that those women who reached the desired family size seek contraception mainly to stop childbearing. In fact, many participants in focus group discussions in Inhambane province reported seeking contraception (especially modern) only after they have reached the desired number of children, unless a woman persistently miscarries or delivers babies that do not survive, which usually happens at older ages and high parity. For spacing, these women rely on long postpartum sexual abstinence which, as discussed in Chapter 6, has not been declining.

As expected, woman's approval of family planning has a strong effect on her likelihood of using contraception. For instance, Model II in Table 8.7 shows that a woman who approves of family planning is 27 times as likely to use traditional contraception, and 18 times as likely to use modern contraception as one who disapproves of family planning. For a married woman (see Appendix Tables G8.1 and G8.2) the approval of the husband and the communication between spouses about family planning are similarly important. A woman who discusses family planning with her husband, particularly if she discusses it more often, or one whose husband approves of family planning, is more likely to use contraception than a woman who does not discuss family planning with her husband or whose husband disapproves of family planning. Not surprisingly, a woman's approval of family planning has a stronger effect on contraceptive use than the approval of the husband, reflecting, perhaps, the fact that even if the husband disapproves of the use of family planning the woman still has the opportunity of using contraception secretly, as has often been the case, if she wants to.

Regarding a woman's region of residence, the results reported in Tables 8.6 and 8.7, and in Appendix Tables G8.1 and G8.2, show that socio-economic factors included in the model could not account for all regional differences, especially the differences in the likelihood of using modern contraception. Women living in either Northern Region or Central Region are less likely than those in Southern Region to practise contraception. An explanation for this pattern may lie in differential access to contraceptive services mainly because regional differences in socio-economic development determine the availability of health care facilities where contraception can be acquired. Supporting this is the fact that users in Northern Region, the least developed, and married users in Central Region are less likely than their counterparts in Southern Region, the most prosperous, to use modern contraceptive methods (see Model III in Tables 8.6 and 8.7).

8.4.2 Intention to use contraception in future

Women who are currently not using any contraceptive method may be doing so for a number of reasons, including being pregnant or trying to get pregnant, or being amenorrhoeic, infecund or sexually inactive (Westoff and Bankole 1997). Factors associated with these women's intention to use or not to use contraception in the future are examined in this section.

Although intention may never be translated into actual behaviour, women's plans to use contraception in the future indicate the potential for reproductive change (Agadjanian 1998c:4). A longitudinal study in Morocco (Curtis and Westoff 1996) found that intention to use had high predictive validity for contraceptive practice during the subsequent three-year period. About 76 per cent of women who stated in the first survey that they intended to use contraception in the following 12 months reported actual use during the subsequent three years, whereas only 30 per cent of those who did not intend to use changed their minds and reported subsequent use of a contraceptive method three years later (Curtis and Westoff 1996:244). Ross and Winfrey (2001:23-24), using data from 27 developing countries, compared the proportion of women who said at 0-3 months after the last birth that they intended to use contraceptives with the increase in use by the period 9-12 months, and found a positive relationship between the intention to use and actual use. On average each increase of 1 per cent in intention resulted in nearly 1 per cent increase in contraceptive adoption.

To examine whether the intention to use contraceptives in the future varies according to woman's background characteristics, the variable 'intention to use' with five categories, intend to use in the next 12 months, intend to use later, intend to use but is unsure about timing, unsure about use and does not intend to use, was recoded into two categories coded '1' if a woman intends to use and '0' if she does not intend to use, and a logistic regression model was fitted. Women who reported that they intend to use contraceptives in the next 12 months and those who said they intend to use later, even if unsure about when, were coded '1', while those who said they were unsure about the use or did not intend to use were coded '0'. The independent variables included in the model are all those used in the previous section plus exposure status, that is, whether a woman wanted her last birth, and prior contraceptive experience.

The results, which are presented in Table 8.8, show that the factors found to influence contraceptive use in the previous section are the same influencing the intention to use in the future. Educated women are more likely than uneducated women to intend to use a contraceptive method in the future, but the odds ratios are significant only for the models on all sexually active women and the separate model on unmarried women. Unpaid work and self-employment are negatively associated with women's intention to use contraceptives compared to non-work, but the odds ratios are not statistically significant among unmarried women.

Table 8.8 Odds ratios from logistic regression analysis of intention to use contraception in the future by socio-economic characteristics, women who are not currently using contraceptives, Mozambique 1997

Socio-economic characteristics	Odds ratios		
	All women	Married women	Unmarried women
Woman's education			
No education	1.000	1.000	1.000
Primary	1.259 ***	1.289	1.483 *
Secondary or higher	1.449 *	1.716	2.213 **
Husband's education			
No education		1.000	1.000
Primary		0.906	
Secondary or higher		0.880	
Employment status			
Not working ®	1.000	1.000	1.000
Unpaid worker	0.710 **	0.660 *	0.877
Self-employed	0.645 ***	0.554 ***	0.809
Paid worker	0.723	0.875	0.975
Religion			
Catholic ®	1.000	1.000	1.000
Protestant	1.111	1.083	1.065
Muslim	0.929	1.233	0.651
Zionist	1.050	0.776	1.065
Other religion	1.070	0.844	0.965
No religion	0.996	0.806	1.071
Ethnicity			
Tsonga ®	1.000	1.000	1.000
Sena/Ndau	1.179	0.914	0.852
Lomwe/Chuwabo	0.369 ***	0.282 *	0.266 **
Macua	1.159	1.208	1.139
Other local	0.624 *	0.345	0.430
Portuguese/foreigner	1.787 **	2.542	1.332
Place of residence			
Urban ®	1.000	1.000	1.000
Rural	0.722 ***	0.773	0.574 ***
Age	0.937 ***	0.971 *	0.920 ***
Household owns radio?			
Yes®	1.000	1.000	1.000
No	1.007	1.112	1.076
Exposure to FP from media			
Exposed to none ®	1.000	1.000	1.000
Exposed to one medium	1.410 ***	1.325	1.231
Exposed to two media	1.718 ***	1.631 *	1.170
Exposed to all three media	1.571 *	1.229	1.649

Table 8.8 Continued…

Socio-economic characteristics	Odds ratios		
	All women	Married women	Unmarried women
Marital status			
Never married	1.312 *		
Monogamous®	1.000	1.000	
Polygynous senior	0.938	1.187	
Polygynous junior	0.952	1.335	
Divorced/widow	0.707		
Exposure status			
Fecund ®	1.000	1.000	1.000
Pregnant	2.098 ***	1.330	2.243 **
Amenorrhoeic	1.768 ***	1.228	1.319
Infecund	0.412 ***	0.168	0.553 **
Wanted last birth			
Wanted then ®		1.000	
Wanted later		1.714 ***	
Wanted no more		1.096	
Fertility preference			
Have another ®	1.000	1.000	1.000
Undecided	1.206	1.132	0.792
No more	2.655 ***	4.477 ***	1.706 *
Infecund	0.652 **	1.830	0.437 ***
Number of surviving children			
None ®	1.000	1.000	1.000
1-2	1.765 ***	1.436	1.964 **
3-4	2.996 ***	1.946	2.524 **
5 +	4.659 ***	2.065	4.409 ***
Prior contraceptive use			
No ®	1.000	1.000	1.000
Yes	2.620 ***	2.576 ***	2.449 ***
Discussed FP with partner			
Never ®		1.000	
Once or twice		4.492 ***	
More often		5.346 ***	
Husband's approval of FP			
Disapproves ®		1.000	
Approves		3.151 ***	
Don't know		2.594 ***	
Respondent approval of FP			
Disapproves ®	1.000	1.000	1.000
Approves	3.924 ***	3.167 ***	3.875 ***
Don't know	0.557 ***	0.460 ***	0.635 *

Table 8.8 Continued...

Socio-economic characteristics	Odds ratios		
	All women	Married women	Unmarried women
Region			
Northern	0.686	0.624	0.888
Central	0.921	1.029	1.216
Southern®	1.000	1.000	1.000
Constant	-0.38	-1.82 **	0.18
- 2 Log likelihood	6529.23	2034.33	1823.14
Chi-square	2571.38 ***	1110.68 ***	725.83 ***
No. of cases	7241	2287	2010

Note: ® Reference category; *p≤0.05; **p≤0.01; ***p≤0.001.
Source: Computed from 1997 DHS.

There are significant ethnic differences in the intention to use contraception. Lomwe/Chuwabo and women of 'other' ethnic group are less likely to intend to use contraceptives, while Portuguese/foreign women are more likely to intend to use contraceptives than the Tsonga. In the separate models for married and unmarried women only the odds ratios for the Lomwe/Chuwabo are statistically significant.

Urban women are more likely than rural women to intend to use contraceptives. Similarly, the odds of intending to use contraception in the future are higher among women who are exposed to family planning messages from at least one media source than among women not exposed to any such messages. However, the odds ratios in the separate models for married and unmarried women are mostly not statistically significant.

Pregnant and amenorrhoeic women are more likely than fecund women to intend to use contraceptives in the future, a finding similar to studies elsewhere in sub-Saharan Africa (e.g. Curtis and Westoff 1996). Women who wanted to have their last child later and those who want no more children are more likely than those who wanted their last child then or want to have another child. Understandably, infecund women have lower odds of intending to use contraceptives than fecund women or women who want to have another child.

Consistent with the analysis of ever-use and current-use, the more living children a woman has the more likely she is to intend to use contraception. The odds of intending to use contraception among all women with 1 to 2 children, 3 to 4, and 5 or more children are 1.8, 3.0 and 4.7 times respectively higher than among women who have no surviving children.

Interestingly, the model on currently married women shows no significant differences in intention to use contraceptives among women in this group.

Past use of contraceptives shows that the odds of intending to use contraception are more than 2.4 times greater among past users than among women without any prior contraceptive experience. Similarly, just as in the previous section, women who approve of family planning, discuss family planning with spouse or partner, or whose husbands approve of family planning are more likely to intend to use contraception than those who disapprove of family planning, who do not discuss it with husband or whose husbands disapprove of family planning. Husband's education, religion, marital status, radio ownership and region do not have a significant effect on intention to use contraception in the future.

8.5 Conclusion

In this chapter bivariate and multivariate techniques were used to examine the levels and socio-economic differentials of contraceptive use in Mozambique. Contraceptive use is low with 6.0 per cent of all women currently using any method of contraception, and only 5.4 per cent (5.1% of married women and 8.7% of unmarried ever sexually active women) using a modern method. As shown in Chapter 1, this level of contraceptive use is the second lowest among Southern African countries, only slightly higher than in Angola. The low level of contraceptive use in Mozambique is partly explained by a weak family planning program (Ross and Stover 2001), especially by its inability to make family planning services available to all potential users. High family-size desire, and opposition to family planning by women and/or their husbands or partners have also helped to keep contraceptive use at a low level.

The results show that contraceptive use is highest in Southern Region, followed by Central and then Northern Region, and these differences could not be accounted for by the socio-economic variables used in the multivariate models. Part of the explanation for these differences lies in differential access to family planning services due to differential health facilities coverage, particularly because the Southern Region includes Maputo City where socio-economic conditions are the best in the country. However, even without Maputo City the Southern Region still has the highest level of contraceptive use. Adding to poor coverage is the shortage of oral contraceptives in many health posts and centres, particularly in rural areas, and the fact that health posts that constituted 66 per cent of all health units in 1999 are not equipped to insert IUD.

Most users prefer modern to traditional methods: 89 per cent of current users were using modern methods. This preference for modern to traditional methods was statistically significant according to many of the socio-economic factors included in the model in favour of women with high socio-economic status. Injections and pills are the most popular methods, being used by about 60 per cent of the users. Injection was the single most popular method of contraception among married, high-parity and less educated women, reflecting its practical simplicity and its convenience for covert use. Among young, low-parity or more educated women the pill was the most popular method.

The analysis of differentials found that most of the socio-economic factors examined influenced contraceptive use in the expected direction. Woman's primary and secondary education increased the likelihood of using both traditional and modern contraception compared to no education, but husband's education increased the probability of using contraception only if its level was beyond primary. Similarly, urban residence increased the use of both traditional and modern methods compared with rural residence. The positive effect of urban residence on the use of traditional methods supports other studies in sub-Saharan Africa which have shown that along with modern methods, traditional methods are better known and used in urban than in rural areas (Bertrand et al. 1985).

The findings on religion showed that socio-economic characteristics could not account for all the religious differentials observed at the bivariate level. Zionism, 'other' religion and no religious affiliation were found to have a negative effect on contraceptive use in comparison with Catholicism and the Protestant religion. Such a finding is consistent with the view that by being socially heterogeneous, large churches are more likely to facilitate the spread of contraceptive innovation to their members than small churches, because the latter tend to be socially homogeneous (Agadjanian 2001b). Unlike religion, ethnic differences in contraceptive use observed at the bivariate level were totally accounted for by the socio-economic factors included in the multivariate models, except for the ethnic Portuguese/foreign who had significantly higher odds of using contraception than the Tsonga; this suggests that, as observed for fertility in Chapter 4, the characteristics hypothesis is the most plausible explanation.

The multivariate analysis found a strong positive association between the number of surviving children and contraceptive use. Although this finding may be somewhat surprising if one thinks of contraception as the 'cause' of lower fertility, it reflects the fact that women in Mozambique, especially in rural areas, consider using modern contraception only when their desired family size has been reached or when they have a reproductive health problem such as persistent miscarriages or delivering babies that do not survive. For these women, since the desired number of children has been reached, the use of contraception is mainly for stopping purposes, which seems consistent with Agadjanian's (1998a) findings in Maputo City of a positive association between parity and women's desire to stop childbearing. However, this does not mean that all users in Mozambique are stoppers, since high-status low parity women use it for delaying the onset of childbearing and spacing the births.

Many studies in sub-Saharan Africa have noted that husband's opposition to family planning and the absence of spousal discussion about this topic are the main barriers for successful family planning programs in the region. The findings in this chapter, apart from confirming the influemce of these factors, also found a strong opposition to contraceptives, perhaps a reflection of poor information, coming from the women themselves: 11 per cent of non-current users. In the multivariate models, women's opposition to contraception had stronger explanatory power than opposition from the husbands.

Finally, as other studies also reported, the analysis in this chapter found that exposure to mass media family planning messages played an important role in women's contraceptive behaviour. Women who were exposed to at least one media source of family planning messages were more likely to have used, be currently using, or intend to use contraception in the future than women who were not exposed to any media source of contraceptive information. However, among married women, the effect of media messages was not statistically significant, partly because family planning messages in Mozambique are directed to HIV/AIDS prevention and do not emphasise fertility control within marriage. Unlike other studies in sub-Saharan Africa (Westoff and Bankole 1997; Jato et al. 1999), being exposed to two or three media sources did not increase the likelihood of using contraception compared to being exposed to only one, reflecting, perhaps, that women who are exposed to one media source are also more likely to be exposed to the other two.

Chapter 9

Fertility-Reducing Effect of the Proximate Determinants

9.1 Introduction

The analysis of fertility levels, trends and differentials (Chapters 3 and 4) and the separate analysis of the proximate determinants of fertility (Chapters 5 to 8) revealed important patterns. However, the relative importance of each of the proximate determinants is still unknown. Thus, this chapter uses the 1997 DHS and applies the analytical framework developed by Bongaarts and his collaborators (Bongaarts 1978, 1982, 1983; Bongaarts and Potter 1983; Bongaarts et al. 1984; Bongaarts, Frank and Lesthaeghe 1990; Frank and Bongaarts 1991).

The proximate determinants are the biological and behavioural factors which directly influence fertility. A change in a proximate determinant changes the level of fertility, (assuming the other proximate determinants remain constant), since they are the main mechanisms through which fertility levels differ between populations. Thus, the application of Bongaarts's framework in this study will reveal how the four proximate determinants, nuptiality, postpartum infecundability, infertility and contraception, discussed individually in the preceding chapters, contribute to the observed level of fertility in Mozambique. To do so, this chapter is organised in three sections. Section 9.2 contains the description of the Bongaarts model; Section 9.3 estimates Bongaarts's indices for Mozambique and discusses the fertility-inhibiting effects of each proximate factor; Section 9.4 provides some concluding remarks.

9.2 The Bongaarts Model

Social, economic and environmental factors influence fertility only through their effect on biological and behavioural factors that bear directly on fertility. These biological and behavioural factors, known as intermediate variables or proximate determinants, were first categorised by Davis and Blake (1956) who identified a set of eleven factors, which they termed 'intermediate variables', intervening between the norms and social structure of a society and its level of fertility. Their framework grouped these factors into three categories: those related to exposure to intercourse, to exposure to conception, and to gestation. Bongaarts (1978) added postpartum infecundability to Davis and Blake's list and narrowed the full set of eight factors to focus only on those that had the greatest effect on fertility levels and varied across populations.

The Bongaarts framework (Bongaarts 1978, 1981, 1982; Bongaarts and Potter 1983; Bongaarts et al. 1984, 1990) identifies eight proximate determinants of fertility: proportion of women married or in sexual unions; postpartum infecundability (amenorrhoea, lactation and abstinence); pathological sterility; contraception; induced abortion; spontaneous intrauterine mortality; natural sterility; and frequency of intercourse. From this set of variables the first five are considered by Bongaarts (1978) the most important in determining the fertility of a population. The other three variables are believed to vary very little across populations and, therefore, their differential effect on fertility is less significant (Bongaarts and Potter 1983).

For the five most important proximate determinants Bongaarts (1978, 1982) proposed the following algebraic expression for computing their fertility-inhibiting effect:

$$TFR = Cm{*}Cc{*}Ci{*}Ca{*}Cp{*}TF \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (9.1),$$

where *TFR* is the total fertility rate, *Cm* is the index of marriage, *Cc* is the index of contraception, *Ci* is the index of postpartum infecundability, *Ca* is the index of abortion, *Cp* is the index of pathological sterility, and *TF* is total fecundity. These indices measure the extent to which total fecundity is reduced from the maximal level, which would be achieved if all women married at age 15 and remained continuously married until the end of their reproductive careers, used no contraception, had no abortions, experienced no pathological sterility, and experienced no lactational infecundability. According to Bongaarts, the value of total fecundity varies between 13 and 17 children per woman, with an average of 15.3 children per woman. The degree to which fertility falls below this maximum depends on the fertility-inhibiting effects of the indices, each of which takes values between 0 and 1. The index equals 1 when there is no fertility-inhibiting effect of that proximate determinant and 0 when their inhibiting effect is absolute, which would also mean a total fecundity (TF) of zero.

Owing to its simplicity and the availability of the required data, the Bongaarts model has been widely used and has been shown to be robust. However, it is not free from criticisms (Hobcraft and Little 1984; Moreno 1991; Reinis 1992; Wood 1994). One criticism is that the model is an aggregate rather than individual approach, which makes it difficult to account for compositional differences among populations through the use of a regression analysis (Wood 1994:79). The estimation of the indices involves a large number of simplifying assumptions and Bongaarts provides only circumstantial evidence to confirm the accuracy of the method, because it is not possible to observe an important parameter that the method estimates, the theoretical level of fertility that would exist in the absence of any inhibiting effect of the proximate determinants (Moreno 1991:314; Wood 1994:79). Menken (1984) and Reinis (1992) evaluated the Bongaarts indices and found that the model produced good estimates under the assumption of random use of contraception, whereas with non-random use of contraception, which is more likely since women tend to use contraception according to their family-building plans, the estimates produced were less accurate, except for the index of postpartum infecundability. In particular, the model performed poorly when women employed stopping behaviour once they had achieved their desired family size and when contraceptive use was concentrated at the later ages (which occurs when the desired family size is high) because use is dominated by women who have become sterile. This results in an overestimation of the effect of delayed marriage - *Cm* that is too low - and an underestimation of the effect of contraception - *Cc* that is too high (Reinis 1992:324-325).

Some of Bongaarts model's shortcomings have been accounted for by alternative approaches to the analysis of the fertility-inhibiting effect of the proximate determinants developed by other researchers, but these could not be applied in this study either because the required data are not available or because they omit some key proximate determinants. Gaslonde and his colleagues (Gaslonde and Bocaz 1970, cited in Hobcraft 1987:827; Gaslonde and Carrasco 1982) developed a sexual life history approach, which identifies, for each year preceding a survey, each month of pregnancy by outcome and then compares the observed fertility rate among the women with the pregnancy rate these women would have attained if all of them had regular sexual relations without using any means of contraception (Gaslonde and Carrasco 1982:9). The main advantage of this method in comparison to that of Bongaarts is the possibility of controlling for the woman's exposure to sexual intercourse by age and other socio-economic characteristics. However, the method omits one key proximate determinant of fertility, especially for sub-Saharan Africa: postpartum infecundability (Hobcraft 1987).

Hobcraft and Little (1984) extended Gaslonde's sexual activity table and developed a 'Fertility Exposure Analysis' for the fertility-inhibiting effect of the proximate determinants framework, which, by adopting an individual-level approach, also permits the use of regression techniques for assessing the effect of the proximate determinants in an integrated framework. But the amount and quality of information required constitute its major drawback (Hobcraft 1987). Moreno (1991), Mosley et al. (1982) and Wood (1994) also proposed alternative models. The model by Moreno (1991) is similar to that by Hobcraft and Little (1984) and demands large amounts of data, while the framework proposed by Mosley et al. (1982) and the dynamic model of the proximate determinants of natural fertility developed by Wood (1994) ignore key proximate determinants of fertility, namely postpartum sexual abstinence and deliberate fertility control methods, respectively. Thus, as mentioned earlier, the alternative frameworks are unsuitable for this analysis. The next section describes how the indices in this study were estimated.

9.3 The Bongaarts Model as applied to Mozambique

This analysis applies Bongaarts's framework with the modifications suggested by Stover (1998). Stover (1998:255) made four major modifications to the original model: the use of sexual activity rather than marriage to indicate exposure; a revision of the sterility index to measure infertility from all causes; a revised index of contraception that accounts for the fact that users of sterilisation may become infecund before age 49; and a revised definition and estimate of total fecundity. Stover (1998) rearranged the proximate determinants equation (Equation 9.1) as follows:

$$TFR = Cx{*}Cu{*}Ci{*}Ca{*}Cf{*}PF \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (9.2),$$

where TFR is the total fertility rate, Cx is the index of sexual activity, Cu is the index of contraception, Ci is the index of postpartum infecundability, Ca is the index of abortion, Cf is the index of infertility, and PF is the potential fertility.

The modifications made by Stover imply a higher total fecundity, 21 children per woman with a range of 18 to 24, than in the original model, 15.3 children per woman with a range of 13 to 17. Stover's version considers a longer period of childbearing (35 years, 15 to 49) than Bongaarts's original model (30 years, 15 to 44). Because in the revised version all the effects of infecundity have been accounted for in the infertility index (Cf), the term 'total fecundity' is no longer appropriate to describe the residual fertility factor; Stover (1998) terms it 'potential fertility' or PF. He then defines PF as the total fertility rate for a population of women who are sexually active and fecund for the entire period from age 15 to 49 and who do not practise breastfeeding, experience postpartum abstinence, or practise contraception (Stover 1998:262). This alternative way of estimating some of the indices and the potential fertility is expected to produce more robust estimates than the original model, especially when a considerable amount of sexual activity and consequent childbearing takes place outside of marriage, the prevalence of sexually transmitted diseases and consequent infertility is high, and a considerable proportion of women are sterilised (Stover 1998:266).

This study's population meets the first two conditions in full. Childbearing and sexual activity outside marriage are common in Mozambique. Thirteen per cent of the births during the 12 months preceding the 1997 census were to unmarried women (see Chapter 4), and the DHS data show that 30 per cent of fecund unmarried women were sexually active in the month before the interview. In relation to infertility and sexually transmitted diseases, the analysis performed in Chapter 7 strongly suggested a high prevalence of both. Thus, the revised version of the model seems more suitable for the analysis than the original version. However, as Chapter 8 revealed, only 11 per cent of women currently using contraception were sterilised. This is not expected to produce a large bias in the results because the model does not necessarily perform badly when sterilisation is not the most preferred method of contraception (Stover 1998) and also because only a small proportion of Mozambican women are currently using contraception.

9.3.1 The estimation of the indices

Because of lack of data, the index of induced abortion was omitted from this application of the model. The indices of the remaining four proximate determinants were computed as follows:

(a) Index of sexual activity (Cx)

Cx, a revised index for Bongaarts's original index of marriage (Cm), represents the reduction in fertility caused by periods during which a woman is not sexually active. Cx equals 1 if all women of reproductive age are sexually active and 0 when none are sexually active. In this study sexual activity refers to the last month, therefore, Cx is taken as the proportion of women aged 15 to 49 who were sexually active in the last month added to women who are not now sexually active but are currently pregnant or practising postpartum sexual abstinence (Stover 1998). Thus,

$$Cx = s,$$

where s is the proportion of women aged 15-49 who are sexually active or pregnant or abstaining postpartum.

Cx estimated in this way is expected to provide a better measure of exposure to the risk of pregnancy than the original Cm because, as stated earlier, a significant proportion of unmarried women in Mozambique are sexually active and hence exposed to the risk of childbearing. The assumption that all sexual activity and childbearing takes place within marriage embodied in the original Cm index does not hold. Jolly and Gribble (1993) had proposed the addition of another variable (Mo) to the original model in order to adjust Cm so that the effect of births outside marriage is captured, but in the absence of complete marriage histories one still needs to assume that there is no marital disruption from the date of first marriage if a woman is married at the time of the survey (Sibanda 1999:85), which may not hold even if women expend less time unmarried because of quick remarriage.

(b) Index of contraception (Cu)

Cu measures the fertility-inhibiting effect of contraceptive use. The index equals 1 if no form of contraception is used and 0 if all fecund sexually active women use 100 per cent effective contraceptive methods. Following Stover's (1998) revision the index is calculated as follows:

$$Cu = 1 - u * e,$$

where u is the proportion of sexually active, fecund women using contraceptives that does not overlap with that experiencing postpartum amenorrhoea; and e is the average effectiveness of contraception. Because this equation assumes that only fecund women use contraceptives, the correction factor for primary sterility used in the original model is no longer applicable, since infecundity is now included in the index of infertility (Stover 1998). The contraceptive use-effectiveness rates applied in this study were adopted from Johnston and Hill (1996:Table 2) and are presented in Table 9.1. The Johnston and Hill (1996) contraceptive use-effectiveness rates are more detailed and lower (represent lower limits of available estimates) than those used in the original model (Bongaarts and Potter 1983:Table 3.9) to ensure that the effect of contraceptive use is not overestimated (Johnston and Hill 1996:110).

Table 9.1 Contraceptive use-effectiveness rate by method of contraception

Contraceptive method	Use-effectiveness rate
Pill	0.82
Injection	0.96
Tubal sterilization	0.99
Vasectomy	1.00
IUD	0.90
Condom	0.62
Vaginal methods	0.80
Periodic abstinence	0.50
Withdrawal	0.38
Other	0.10

Source: Johnston and Hill (1996:Table 2).

(c) Index of postpartum infecundability (Ci)

The index of postpartum infecundability measures the effect of the extended periods of postpartum amenorrhoea and abstinence on fertility. The index equals 1 in the absence of lactation and postpartum abstinence and 0 when infecundability is permanent. It is calculated as the average birth interval in the absence of breastfeeding, divided by the average length of the interval when breastfeeding takes place:

$$Ci = \frac{20}{18.5 + i}$$

where i is the average number of months of postpartum infecundability due to the combined effect of postpartum amenorrhoea and abstinence. By combining the effects of both postpartum abstinence and lactational amenorrhoea in estimating Ci, a more complete measure of the postpartum period is obtained, because the additional effect of abstinence prolonged beyond the period of amenorrhoea, which is common for some sub-groups in Mozambique and elsewhere in sub-Saharan Africa (see Chapter 6, Caldwell and Caldwell 1977, 1981; Bongaarts 1981; Gaisie 1984) is taken into account. Thus the index of postpartum infecundability was calculated as:

$$Ci = Camen * Cabst,$$

where

$$Camen = \frac{20}{18.5 + amen}$$

$$Cabst = \frac{(18.5 + amen)}{(18.5 + i)}$$

where Ci is the index of postpartum infecundability; $Camen$ is the index of effect of lactational amenorrhoea; $Cabst$ is the index of additional effect of abstinence prolonged beyond the period of amenorrhoea; $amen$ is the mean duration in months of postpartum amenorrhoea; and i is the mean duration of infecundability due to combined effects of postpartum amenorrhoea and postpartum sexual abstinence. The mean durations of amenorrhoea, abstinence and infecundability were estimated using the Prevalence/Incidence method (see Chapter 6).

(d) Index of infertility (Cf)

The restriction to primary infertility by the original Bongaarts index of sterility (Ip) ignores an important fertility-inhibiting factor, secondary infertility, which is particularly important in sub-Saharan Africa including Mozambique; it also makes it difficult to interpret the results because in cases where the proportion childless is less than the standard of 3 per cent (Frank 1983; Bongaarts et al. 1984), the Ip index is greater than 1 implying a positive effect of infertility on fertility.

The revised index of infertility (Cf) is intended to measure the fertility-inhibiting effects of primary and secondary infertility due to disease or any other cause. A woman is defined as infertile if she is not menopausal, postpartum amenorrhoeic, or pregnant, has not used a contraceptive method, has been in union during the last five years and has not given birth during that period. Thus the Cf index is calculated as follows:

$$Cf = 1 - f$$

where f is the proportion of sexually active women who are infertile. Because Cf takes into account all forms of infertility, not only primary infertility, as the Ip index (index of infertility in the original model), it is likely to give better results of the effect of infertility because, as Chapter 7 has shown, secondary infertility is higher than primary infertility in Mozambique.

9.3.2 Results

Tables 9.2 and 9.3 present the estimated indices of sexual activity, contraception, postpartum infecundability and infertility. At the national level (Table 9.2), the age-specific version of the model was applied to assess any age-related variation in the effect of individual proximate determinants of fertility.

(a) Effect of sexual activity (*Cx*)

As shown in Table 9.2, the index of sexual activity indicates that 78 per cent of fecund women of reproductive age are sexually active, that is, are exposed to the risk of pregnancy. This implies that had all fecund women been sexually active the observed TFR would have increased by 22 per cent, the other proximate determinants being constant. An examination of the effect of sexual activity by age reveals that the greatest fertility-reducing effect of sexual activity is at age groups 15-19 and 45-49 with little variation among the middle age groups. In the youngest age-group the fertility-reducing effect of *Cx* operates through marriage since a significant proportion of women in this age-group have never been married and are relatively sexually inactive, while for the oldest age-group a high fertility-inhibiting effect may reflect the decline of sexual activity by age. It may also be related to prevalence of definitive widowhood and divorce, as well as terminal abstinence among older women, although the effect of widowhood may be attenuated by the practice of levirate (wife inheritance) which still occurs in some rural areas.

A look at the effect of sexual unions by woman's socio-economic characteristics (Table 9.3) shows that, in relation to place of residence and education, the pattern of variation in *Cx* is as expected: a higher reducing effect (lower index) in urban than in rural areas, and among educated than uneducated women. *Cx* also varies according to religion and ethnic affiliation. The reducing effect of *Cx* is highest among the Zionists (34%) and lowest among the Muslims (14%), reflecting latest and youngest marriage patterns characterising Zionists and Muslims, respectively (see Chapter 5). Also consistent with ethnic differences in age at marriage, the reducing effect of sexual inactivity on fertility is highest among the Portuguese/foreigners (47%) followed by the Tsonga (31%), and is lowest among the Macua (12%). These ethnic differences are reflected in the regional variation of *Cx*: in Northern Region where Macua predominate *Cx* is 0.88 while in Southern Region, inhabited predominately by Tsonga and Portuguese/foreigners, *Cx* is 0.67.

Table 9.2 Proximate determinants of fertility by age, Mozambique 1997

Age group	Observed TFR[a]	Index of sexual activity	Index of contraception	Index of postpartum infecundability[b]			Index of infertility	Potential fertility PF	
		Cx	*Cu*	*Camen*	*Cabst*	*Ci*	*Cf*	Observed	Model
15-19	0.865	0.578	0.972	0.556	0.888	0.494	0.973	3.2	3.4
20-24	1.151	0.868	0.903	0.554	0.898	0.497	0.939	3.1	3.3
25-29	1.286	0.881	0.905	0.536	0.899	0.482	0.900	3.7	3.1
30-34	1.014	0.872	0.885	0.563	0.938	0.528	0.906	2.7	3.0
35-39	0.869	0.855	0.849	0.569	0.972	0.553	0.835	2.6	2.9
40-44	0.563	0.819	0.854	0.566	0.861	0.487	0.560	3.0	2.8
45-49	0.281	0.606	0.863	0.566	0.917	0.519	0.535	1.9	2.7
15-49	6.0	0.783	0.896	0.564	0.911	0.514	0.849	19.7	21.0

Note: [a]Estimates are based on births in the last five years; [b]*Camen* is the index of effect of lactational amenorrhoea; *Cabst* is the index of additional effect of abstinence prolonged beyond the period of amenorrhoea; *Ci* =*Camen* x *Cabst*.
Source: Computed from 1997 DHS; Model PF, Stover (1998:Table 6).

(b) Effect of contraception (*Cu*)

Coale (1973:65) postulates that there are three necessary conditions for the onset of fertility decline: fertility has to be within the calculus of conscious choice; low fertility is perceived as advantageous; and effective means of fertility control have to be available and couples willing to use them. The analysis of the fertility-inhibiting effects of contraceptive use gives the opportunity to assess if these propositions are evident and whether or not women have begun to adopt modern reproductive practices. The empirical evidence presented in Table 9.2 shows that this is clearly not the case in Mozambique: contraceptive use has the lowest fertility-reducing effect when compared to the other three proximate determinants examined in the study. The index of contraception reduces fertility from its potential by only 10 per cent. As mentioned in Chapter 8, effective means of contraception are not readily available for all potential users and the advantages of low fertility are yet to be perceived by the majority of Mozambican individuals or couples.

The examination of the index of contraception by age group reveals an interesting pattern: *Cu* decreases as age increases, meaning that the fertility-inhibiting effect of contraception gets stronger with age. A plausible explanation for this pattern is that, because the desired family size is still high, six children according to 1997 DHS, older women, who are more likely to have attained the desired family size, are more likely than young women to use contraception. In fact, the analysis in Chapter 8 has shown that the number of surviving children had a strong positive effect on contraceptive use even after other socio-economic factors were controlled.

Table 9.3 Proximate determinants of fertility by socio-economic characteristics, Mozambique 1997

Socio-economic characteristics	Observed TFR[a]	Index of sexual activity *Cx*	Index of contra-ception *Cu*	Index of postpartum infecundability[b] *Camen*	*Cabst*	*Ci*	Index of infertility *Cf*	Potential fertility *PF*
Place of residence								
Urban	4.5	0.715	0.747	0.660	0.871	0.575	0.909	16.1
Rural	6.1	0.804	0.957	0.556	0.854	0.475	0.826	20.3
Education								
No education	6.0	0.818	0.947	0.535	0.923	0.494	0.800	19.7
Primary	5.6	0.767	0.885	0.589	0.903	0.532	0.875	17.7
Secondary +	2.8	0.631	0.642	0.776	0.923	0.716	0.955	10.0
Religion								
Catholic	5.6	0.803	0.874	0.554	0.889	0.492	0.855	18.9
Protestant	5.8	0.734	0.843	0.598	0.907	0.542	0.846	20.4
Muslim	5.5	0.864	0.945	0.556	0.895	0.498	0.859	15.8
Zionist	5.5	0.657	0.879	0.570	0.919	0.524	0.822	22.1
Other religion	5.8	0.769	0.859	0.583	0.927	0.541	0.852	18.9
No religion	5.9	0.804	0.931	0.551	0.963	0.531	0.816	18.0
Ethnicity								
Tsonga	5.1	0.690	0.821	0.584	0.887	0.518	0.845	20.5
Sena/Ndau	6.1	0.802	0.918	0.566	0.939	0.532	0.858	18.1
Lomwe/Chuwabo	5.7	0.821	0.953	0.617	0.946	0.584	0.848	14.6
Macua	6.2	0.880	0.957	0.544	0.903	0.491	0.839	17.8
Other local	5.6	0.852	0.861	0.553	0.926	0.512	0.764	19.7
Portuguese	3.6	0.526	0.667	0.773	0.890	0.687	0.902	16.7
Region								
Northern	6.0	0.877	0.965	0.548	0.903	0.495	0.834	17.1
Central	6.4	0.814	0.918	0.563	0.913	0.514	0.869	19.3
Southern	4.9	0.670	0.796	0.585	0.884	0.517	0.850	20.8
Mozambique	6.0	0.783	0.896	0.564	0.911	0.514	0.849	19.7

Note: [a]Estimates are based on births in the last five years; [b]*Camen* is the index of effect of lactational amenorrhoea; *Cabst* is the index of additional effect of abstinence prolonged beyond the period of amenorrhoea; *Ci* =*Camen* x *Cabst*.
Source: Computed from 1997 DHS.

As with the index of sexual activity, subgroup variations in index of contraception are more substantial according to place of residence, education and region than according to religion and ethnicity. There is a 20-percentage-point difference in *Cu* between urban and rural women and a 30-percentage-point difference between women with secondary education and those with no education, with the fertility-inhibiting effect of contraception being higher in urban than rural and among educated than uneducated women. The relatively high use of effective contraceptive methods in Southern Region, partly due to relatively easy access, is evident from a Cu of 0.80 as compared to 0.92 in Central Region and 0.97 in Northern Region. The effect t of contraception is less among Muslims (Cu=0.95) and women with no religion (Cu=0.93) than other religious groups (Cu about 0.85) but the difference is rather small, while in relation to ethnicity, as one would expect given their socio-economic status, the Cu is lowest (inhibiting effect greatest) among the Portuguese/foreigners (0.67) and highest among the Macua (0.96).

(c) Effect of postpartum infecundability (Ci)

Ci has the smallest value (0.51), indicating that postpartum infecundability has the largest fertility-inhibiting effect of all the proximate determinants examined in the present study. Ci indicates that postpartum infecundability reduces fertility from its potential maximum by as much as 49 per cent. Such an effect is consistent with results from other countries of sub-Saharan Africa (e.g. Jolly and Gribble 1993, on a number of countries; Sibanda 1999, on Kenya and Zimbabwe; Mba 2002, on Ghana). The belief that a man's sperm can endanger the health of a suckling child by poisoning the breastmilk, coupled with the practice of long breastfeeding, contributes to a non-susceptible period of 20.4 months (see Chapter 6).

The examination of Ci by age group reveals no major age-related differences in the fertility-reducing effect of postpartum infecundability, which is consistent with the finding in Chapter 6 that both breastfeeding and postpartum sexual abstinence have remained unchanged over time. However, there are some differences in Ci according to woman's socio-economic characteristics: Ci is lower among women in rural areas, indicating that either breastfeeding or postpartum abstinence has a stronger fertility-reducing effect there than in urban areas. Similarly, the effect of postpartum infecundability on fertility decreases with woman's education, mainly because women with less education tend to breastfeed their children and abstain from sexual relations after a birth longer than more educated women (see Chapter 6). Small differences in Ci exist between religious groups, while among the local ethnic groups (that is, excluding the Portuguese/foreigner category), Macua (Ci =0.49) exhibited the largest effect, and Lomwe/Chuwabo (Ci =0.58) the smallest. It is important to note here that despite a large difference in the duration of sexual abstinence between these two ethnic groups, the difference in Ci is small, reflecting the fact that both breastfeed for two years (see Chapter 6) which keeps postpartum amenorrhoea at about the same duration.

(d) Effect of infertility (*Cf*)

Infertility is the third most important fertility-inhibiting factor, behind postpartum infecundability and sexual activity. Tables 9.2 and 9.3 show that in the absence of infertility the TFR would have increased by 15 per cent, an effect similar to that found in other sub-Saharan countries (see Stover 1998:Table 4.1). As one would expect, the fertility-inhibiting effect of infertility increases with woman's age from 3 per cent at age group 15-19 to 46 per cent at age group 45-49. Infertility has a greater effect in inhibiting fertility among rural than urban women, probably because of lower access to treatment of infertility-related diseases and to less skilled assistance during delivery in rural than in urban areas (see Chapter 7). *Cf* increases with education, indicating that infertility has a stronger inhibiting effect among uneducated than educated women, which is consistent with the higher prevalence of infertility, secondary infertility in particular, among uneducated than educated women reported in Chapter 7. *Cf* varies little according to ethnicity, religion and region. In relation to ethnicity, the highest *Cf* (smallest effect) is found among the Portuguese/foreigners and the lowest *Cf* among women of 'other' local ethnic affiliation. The value for the latter is rather surprising since the prevalence of infertility is highest among the Macua, who have the second lowest *Cf* in Table 9.3. It is likely that the value for the 'other' local ethnic group is largely affected by sampling variation due to small numbers.

(e) Potential fertility (PF)

Potential fertility is the hypothetical number of births a woman would have at the end of her reproductive career if the four measured proximate determinants had no effect on fertility, and is calculated by dividing the observed TFR by the product of the four indices. If these four proximate determinants were the only source of variation in observed fertility, and if natural fecundity did not vary between subgroups, PF values shown in the last column of Table 9.3 would cluster around one value, 21 births per woman. Assuming that the variation in PF between subgroups is minimal, the large variation in PF values shown in Tables 9.2 and 9.3 suggests either that the measurement of the determinants contains some errors or that important proximate determinants have been omitted from the model. Inadequate measurement of the proximate determinants could result from errors in the survey data such as under-reporting of contraceptive use, inaccurate reporting of sexual activity or birth histories. The observed TFR may suffer from under-reporting of births, especially live births that died in infancy, and birth displacement. However, displacement of births may have not been a major issue for births in the five-year period before the survey (used in this analysis) since, as mentioned in Chapter 3, there was an important event in the country that occurred exactly five years before the survey, the end of civil war, which may have been used by the respondents to identify the births that occurred after and before that event. The accuracy of the reports on contraceptive use and sexual activity is difficult to assess.

Among the omitted proximate determinants, induced abortion is the most influential and is known to reduce fertility in some populations. Thus, the failure to incorporate induced abortion in the model may have resulted in the underestimation of PF in areas or subgroups with high abortion rates. Indeed, urban and high-educated women exhibit low PF values, suggesting that the fertility-inhibiting effect of induced abortion may not be negligible among these women. Although reliable information on induced abortion is not available, studies based on hospital records in Maputo City (Hardy et al. 1997; Machungo et al. 1997; Agadjanian 1998b) indicate that abortion is common, especially among young, unmarried and educated women. Agadjanian's (1998b) study found that the main reasons for women seeking abortion were material difficulties in raising children, the wish to continue their studies and a need to space or stop childbearing. Surprisingly, only one per cent of women sought abortion because the contraceptive methods that were used had failed. It is important to note that women who seek abortion service at hospitals are only a small proportion of potential abortion seekers, usually representing a segment of highly educated women who can afford to pay for the service. The majority of poor and less educated women undergo abortion with providers (many of whom are unskilled) outside the hospital and only resort to hospital when post-abortion complications arise (Hardy et al. 1997).

9.3.3 The relative contribution of the proximate determinant factors

So far, the discussion has centred on the fertility-inhibiting effect of each the proximate determinants. In this section an attempt is made to quantify these effects in terms of number of births averted per woman, and the relative strength of the influence of each proximate determinant on the reduction of fertility from its potential (PF) to the observed level. In determining the number of births averted, a series of equations developed by Bongaarts and Potter (1983) is used to calculate the effect of each proximate determinant following the order in which they appear in the equation[20]. This specific order is very important because the number of the estimated births depends on the order in which are calculated (Jolly and Gribble 1993).

The results of this exercise indicate that 8.1 births per woman were averted by prolonged postpartum infecundability, 6.6 through postpartum amenorrhoea and 1.5 through postpartum abstinence that exceeds amenorrhoea; 3.0 births by the prevalence of infertility; 1.7 births by non-exposure to sexual intercourse; and only 0.9 births were averted by use of contraception. Clearly, postpartum infecundability is by far the greatest fertility-reducing factor in Mozambique. However, the importance of each index in reducing fertility in comparison with the others is best assessed by determining the standardised percentage contribution of each proximate determinant to the reduction of fertility from PF to the observed TFR. Such relative contributions were calculated using a logarithmic transformation (Casterline et al. 1984:35)[21] and the results are presented in Tables 9.4 and 9.5. According to Casterline et al. (1984:35), this approach is appropriate for comparison between subgroups because the absolute fertility levels and the difference between the PF and TFR do not enter in. Since ln(PF) – ln(TFR) is decomposed, the percentages refer to the ratio PF/TFR, not the difference between them.

Postpartum infecundability has the highest fertility reduction effect in Mozambique, accounting for 56 per cent of the total: 48 per cent through lactational amenorrhoea and 8 per cent through postpartum abstinence. The lowest contribution for the reduction of fertility comes from the use of contraception with 9 per cent; lack of exposure to a union and infertility also have fairly substantial effects.

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[20] Effect of sexual unions $=TFR/C_x - TFR$; effect of contraception $= (TFR/(C_x*C_u)) - TFR/C_x$; effect of postpartum infecundability $= (TFR/(C_x*C_u*C_i)) - (TFR/(C_x*C_u))$; effect of infertility $= (TFR/(C_x*C_u*C_i*C_f)) - (TFR/(C_x*C_u*C_i))$.

[21] If R_x, R_u, R_i and R_f are the relative contributions of sexual unions, contraception , postpartum insusceptibility and infertility respectively, then
$R_x = \ln(C_x)/(\ln(C_x)+\ln(C_u)+\ln(C_i)+\ln(C_f))*100$;
$R_u = \ln(C_u)/(\ln(C_x)+\ln(C_u)+\ln(C_i)+\ln(C_f))*100$;
$R_i = \ln(C_i)/(\ln(C_x)+\ln(C_u)+\ln(C_i)+\ln(C_f))*100$;
$R_f = \ln(C_f)/(\ln(C_x)+\ln(C_u)+\ln(C_i)+\ln(C_f))*100$;
Where ln denotes the natural logarithm and C_x, C_u, C_i and C_f are the indices of sexual unions, contraception, postpartum infecundability and infertility, respectively.

Table 9.4 Percentage of overall reduction from potential fertility rate to observed total fertility rate due to each determinant, Mozambique and selected sub-Saharan countries, 1990 to 1997

	Observed	Percentage reduction due to			
Country and year	TFR	Sexual inactivity	Contraception	Infecundability	Infertility
Cameroon, 1991	5.8	28.3	12.9	43.0	15.7
Nigeria, 1990	6.0	25.3	5.4	51.4	17.8
Rwanda, 1992	6.2	36.6	10.5	41.4	11.4
Senegal, 1993	6.0	34.9	5.7	43.6	15.9
Zambia, 1992	6.5	32.7	9.4	44.6	13.3
Mozambique, 1997	**6.0**	**20.7**	**9.3**	**56.2**	**13.8**

Source: The figures for Mozambique were computed from 1997 DHS; the TFRs and the indices used to estimate the reducing effects for the selected countries were taken from Stover (1998:Table 4).

When comparing the relative strength of the indices in Mozambique with those derived from sub-Saharan countries with total fertility rates similar to Mozambique (Table 9.4), it is found that all have postpartum infecundability as their highest and contraception as their lowest fertility reducers. The reducing effect of sexual inactivity is lower and that of postpartum infecundability is higher in Mozambique than in all countries included in Table 9.4, reflecting earlier entry into sexual union and longer breastfeeding and postpartum abstinence in Mozambique than in the selected countries. In relation to the effect of contraception, however, only in two of the five countries in the table is its reducing effect higher than in Mozambique, whereas the fertility reducing effect of infertility is similar to the effects in the other countries.

There is evidence of subgroup variation in the relative strength of the proximate determinants in reducing fertility (Table 9.5), but postpartum infecundability maintains the strongest reducing effect in most subgroups. The most notable variation in the relative contribution of the proximate determinants to the observed fertility is found among educational and residential subgroups of women. The percentage of fertility reduction due to use of contraception and sexual inactivity is low and that due to postpartum infecundability and infertility is high among uneducated and primary-educated women. In contrast, women with secondary education compensate for the short duration of postpartum infecundability and low levels of infertility by using contraception and delaying entry to sexual union. Corresponding reductions from potential fertility rate for urban and rural women are also accomplished by very different means: urban women experience more reduction in fertility due to sexual inactivity and use of contraception than rural women, who are much more affected by extended postpartum infecundability and infertility.

Table 9.5 Percentage of overall reduction from potential fertility rate to observed total fertility rate which is due to each determinant by socio-economic characteristics, Mozambique 1997

Socio-economic characteristics	Percentage reduction due to					
	Sexual activity	Contraception	Infecundability			Infertility
			Amen.	Abst.	Infec.	
Place of residence						
Urban	26.3	22.9	32.5	10.8	43.3	7.5
Rural	19.4	3.9	52.3	7.3	59.6	17.1
Education						
No education	17.0	4.6	52.8	6.7	59.5	18.9
Primary	23.0	10.6	46.0	8.9	54.8	11.5
Secondary or higher	35.9	34.5	19.8	6.2	26.0	3.6
Religion						
Catholic	18.0	11.0	48.4	9.7	58.1	12.9
Protestant	24.5	13.6	40.8	7.8	48.6	13.3
Muslim	13.9	5.4	55.8	10.5	66.3	14.4
Zionist	30.2	9.2	40.5	6.1	46.5	14.1
Other religion	22.1	12.8	45.3	6.4	51.7	13.4
No religion	19.3	6.4	52.9	3.3	56.2	18.1
Ethnicity						
Tsonga	26.6	14.1	38.6	8.6	47.2	12.1
Sena/Ndau	20.2	7.9	52.1	5.8	57.9	14.0
Lomwe/Chuwabo	20.8	5.0	50.9	5.9	56.7	17.4
Macua	12.0	4.1	57.6	9.7	67.3	16.6
Other local	12.8	12.0	47.5	6.1	53.6	21.5
Portuguese/foreigner	42.1	26.5	16.9	7.7	24.6	6.8
Region						
Northern	12.5	3.4	57.2	9.7	66.9	17.2
Central	18.7	7.8	52.3	8.3	60.7	12.8
Southern	27.6	15.7	37.0	8.5	45.5	11.2
Mozambique	20.7	9.3	48.4	7.8	56.2	13.8

Note: Amen. is the reduction due to lactational amenorrhoea; Abst. is the reduction due to abstinence prolonged beyond the period of amenorrhoea; reduction due to infecundability (Infec.) =Amen. + Abst.
Source: Computed from 1997 DHS.

Further examination of Table 9.5 shows that there are substantial differences in the relative effect of the proximate determinants by religion, ethnicity and region, with the most notable being in the contribution of contraception and sexual union. Reductions in fertility due to sexual inactivity are highest among Zionists and lowest among Muslims. This is not surprising since, as reported in Chapter 5, Muslims marry on average three years earlier than the Zionists, and about two years earlier than the remaining religious groups. Also unsurprising is the indication that Portuguese/foreigners experience the largest relative effect of sexual inactivity and contraception, and lowest reduction due to postpartum infecundability and infertility. Portuguese/foreign women are the most educated and urbanised in the country. Among the local ethnic groups, and consistent with their marriage patterns, Tsonga experience the highest and and Macua the lowest effects of sexual inactivity. The reducing effect of contraception is higher among the Tsonga and the 'Other' ethnic group than among the remaining ethnic groups. The relatively high contribution of contraception in reducing fertility of the Tsonga and 'Other' compensates for a relatively low contribution of postpartum infecundability, in comparison with the remaining groups.

Relative reductions of fertility due to sexual inactivity and use of contraception increase from Northern Region to Southern Region while the relative strength of postpartum infecundability and infertility decrease. As mentioned in earlier chapters, the predominance of Islamic religion, low levels of education and Macua background, all associated with young age at marriage, make the Northern Region the one with the earliest age at marriage in the country. The Macua also have the longest postpartum abstinence period and a higher level of sexual freedom, which are reflected in the reducing effects of postpartum infecundability and infertility shown in Table 9.5. From north to south, age at marriage increases and socio-economic conditions also improve, contributing to the decline in the strength of postpartum infecundability and infertility.

9.4 Conclusion

In this chapter Stover's (1998) revised version of Bongaarts's model was applied to the 1997 DHS to assess the fertility-inhibiting effects of sexual inactivity , contraception, postpartum infecundability and infertility, and their relative strength in reducing fertility from its potential maximum to the observed TFR. Stover's (1998) version accounts for high levels of non-marital childbearing and the prevalence of infertility, especially secondary infertility, which are not accounted for by the original version of the model.

The results show that the fertility-inhibiting effects of postpartum infecundability are more important than the combined effect of sexual inactivity, infertility and contraceptive use. About 56 per cent (48% due to amenorrhoea and 8% due to abstinence) of the reduction of fertility from its potential to the observed level is due to the effect of postpartum infecundability, with little variation according to woman's age, a finding consistent with the practice of long breastfeeding and postpartum sexual abstinence reported in Chapter 6.

In relation to marriage or sexual unions, the results have shown that not being in a sexual union, that is, sexually inactive in the last month, was the second most important factor in reducing fertility in Mozambique, contributing about 21 per cent of the reduction in fertility from its potential to the observed TFR. The effect of sexual unions is more pronounced at the youngest age group (15-19), with a reduction of 42 per cent, and drops rapidly to 14 per cent in the following age group (20-24), consistent with the concentration of entry into a sexual union in Mozambique between the late teens and early twenties. Women in the oldest age group (45-49) exhibited the second highest reducing effect of sexual unions (26%), reflecting, perhaps, low sexual activity due to increased likelihood of definitive widowhood, divorce and terminal abstinence.

Regarding infertility, the analysis in this chapter has shown that this proximate determinant is an important fertility-inhibiting factor in Mozambique, and its effect is stroger than that of contraception. The results have shown that in the absence of infertility the observed TFR would have increased by about 14 per cent. Contributing to such an effect is the high prevalence of secondary infertility, mainly caused by sexually transmitted diseases, malaria, and childbirth infections due to lack of skilled assistance at delivery (see Chapter 7).

Contraception was the least important fertility-inhibiting factor, reflecting a contraceptive prevalence of only 5.4 per cent among all women. Contraceptive use contributed only 9 per cent to the reduction of fertility from its potential to the observed level. The results also showed that the importance of contraception increased gradually with age, but its relative strength was greatest in the middle-high age group (30-39), the years when most women have already had 4 or 5 children.

Another important finding is the subgroup variation in the relative strength of the proximate determinants in reducing fertility from its potential to the observed level. Rural and less educated women relied more on long periods of postpartum infecundability to reduce their fertility and experienced a low reduction in fertility due to contraception or loss of union exposure. In contrast, more educated and urban women compensated for relatively short durations of postpartum infecundability and low prevalence of infertility by the use of contraception and delayed entry into sexual union. There were also regional differences: the reducing effects of postpartum infecundability and infertility declined from Northern to Southern, while those of contraception and sexual inactivity increased, indicating that the change from the traditional reproductive pattern, with postpartum infecundability the main inhibiting factor, to a modern reproductive pattern, with increased role of contraception and delayed entry into sexual union, is most advanced in Southern Region and least advanced in Northern Region.

Finally, although data on induced abortion were not available, the analysis in this chapter suggests that its fertility-inhibiting effect is not negligible, at least among more educated and urbanised women. The estimated potential fertility was particularly low among the sub-groups of women known to have high prevalence of induced abortion probably indicating that an important proximate determinant has not been taken into account.

Chapter 10

CONCLUDING REMARKS

10.1 Introduction

Knowledge of fertility behaviour in Mozambique is limited partly because of the lack of both reliable and detailed data and partly because of the lack of thorough evaluation and analysis of the data from existing sources. This thesis used both quantitative and qualitative approaches to examine fertility behaviour in contemporary Mozambique. In Chapter 1, three questions were asked: has fertility started to decline in Mozambique? What are the regional and provincial differences in fertility and how are they explained? How important are the effects of socio-cultural and economic diversity on fertility and its proximate determinants, nuptiality, postpartum infecunadability, infertility and contraception?

In addressing these questions the analysis was guided by a theoretical framework adapted from the Bongaarts (1978) model of the proximate determinants of fertility, according to which social, economic and environmental factors influence fertility only through their impact on biological and behavioural factors (proximate determinants) that bear directly on fertility. Each of the main proximate determinants of fertility was first examined separately, with the effects of socio-economic and cultural factors assessed using bivariate and multivariate approaches, before being integrated into the Bongaarts framework to assess their relative strength in reducing fertility. This allowed a better understanding of the operation of the socio-economic determinants, especially because a socio-economic factor can have a negative effect on fertility through one proximate determinant and a positive effect through another, so that the overall net effect of that particular factor can be negative, positive or insignificant depending on the balance between the negative and the positive effects (Bongaarts et al. 1984). The conclusions that can be drawn from the study are discussed below.

10.2 Fertility levels and trends

Given that vital registration is incomplete, the study of levels and trends in fertility has to rely on census or survey data. However, it has long been suggested that results of censuses and surveys collected in developing countries, especially in sub-Saharan Africa, usually suffer from serious errors and biases. Considering the possibility of reporting errors and their potential effect on the estimates, the main data sources used in the analysis were evaluated in Chapter 2, focusing on geographic coverage, collection procedures and data quality. The assessment found that the age data for women in the reproductive ages were distorted mainly through digit preference, especially the preference for 0 and 5, and by age exaggeration, and that some births were omitted (especially by older women) or displaced, but not so badly as to preclude the use of indirect estimation methods.

In order to answer the first research question, whether fertility has started to decline in Mozambique, available information for the period pre-1980 was examined and several indirect techniques were applied to published and unpublished data from the 1980 census and to the 1997 census and the 1997 DHS data sets. On the basis of the information relating to the period before 1980, it was found that the level of fertility had remained very high at about 7 children per woman. The estimated TFR was 7.1 children per woman in 1950, falling slightly to 7.0 children per woman in 1960 and then to 6.6 children per woman in 1970, before rising to 7.1 children per woman in 1980. Although the increase in TFR from 1970 to 1980 may partly reflect the poor quality of data, it may also be due to a reduction in pathological infertility following the post-independence government's efforts in providing universal and free access to health services and vaccination campaigns that contributed to the reduction of gonorrhoea and other STDs associated with infertility. This finding is supported by the fact that other sub-Saharan countries also experienced fertility increase in the same period as a result of reductions in pathological infertility (see Romaniuk 1980; Frank 1983; Cohen 1998).

The application of various indirect methods of fertility estimation in Chapter 3 suggested a fall in the TFR from 7.1 children in 1980 to 6.1 children per woman in 1997, with the corresponding TFRs for 1980 and 1997 by region being 6.7 and 6.4 children per woman in Northern Region; 7.9 and 6.7 children per woman in Central Region; and 6.2 and 5.1 children per woman in Southern Region. These figures imply a fertility decline between the two censuses of 14 per cent for the country, and 5, 14 and 17 per cent for Northern, Central and Southern Regions respectively.

However, further examination of fertility trends, using the more robust methods, analysis of period and cohort fertility from DHS birth histories, P/F ratios from birth histories, censured parity progression ratios and reconstructed birth histories from the 1997 census, found that fertility decline was well established only in Southern Region (see Tables 3.9 to 3.13), with the decline being fastest in the nation's capital, Maputo City (see Appendix Figure C3.3.1). However, in the other two regions, Northern and Central, this analysis failed to identify any clear indication of a consistent trend towards lower fertility, and because 74 per cent of the population live in these two regions, the decline in fertility which is taking place in the Southern Region has not had a substantial effect on the whole country.

The evidence of fertility decline in Southern Region showed that the decline, which started in the early 1980s, has been gradual and has been occurring across all age groups and birth orders, which is consistent with that observed in other sub-Saharan countries and with the Caldwell et al. (1992) prediction that the fertility decline in this region would not be accompanied by a change in the distribution of the age pattern of fertility, as in the historic Europe and in the developing countries of Asia and Latin America.

Why is fertility declining in Southern Region but not in Northern and Central Regions? This study suggests that regional differences in socio-economic development may be part of the explanation (see Chapter 4). Caldwell and his colleagues (Caldwell et al. 1992:212-213; Caldwell and Caldwell 1993:244) identified three conditions under which fertility decline is likely to occur in a sub-Saharan African country: an infant mortality rate not above 70 per thousand live births; nearly all girls going to primary school and at least 30 per cent attending secondary school; and at least 25 per cent of currently married women practising family planning with 20 per cent using modern methods. Although Caldwell's thresholds refer to the national level and evidence of fertility decline may exist without meeting any of these conditions (e.g. Hinde and Mturi 2000, for Tanzania), they may be a useful guide also for sub-national level, but should be used flexibly. Considering this, the Southern Region is clearly the most likely to experience fertility decline. In 1997 the national infant mortality rate was twice Caldwell's threshold, at 145, contraceptive prevalence rate was 5 per cent, and only 38 per cent of girls of school age (6-15) were attending school. However, in Southern Region, where fertility decline is well established, the infant mortality rate in 1997 was 95 per thousand live births, against 163 in Northern Region and 157 in Central Region (Mozambique 1999:Table 23); 10 per cent of married women used modern contraceptives, against 2 per cent in Northern Region and 4 per cent in Central Region; and 64 per cent of school-age girls were attending school, against 25 per cent in Northern Region and 30 per cent in Central Region.

The Southern Region is the most prosperous region and improvements in education and mortality have been greater than in either Northern or Central Regions. In addition, the Southern Region is more culturally homogeneous (87% of the population in 1997 were Tsonga) than Northern and Central Regions, which facilitates the spread of new reproductive ideas that are important for fertility decline (Cleland and Wilson 1987). In Northern and Central Regions such a spread of ideas is hindered not only by language diversity but also by the fact that only a small proportion of the population can speak Portuguese, the official language. According to the 1997 census only 27 per cent in Northern Region and 35 per cent in Central Region of the population aged 15 and over could speak Portuguese, compared with 60 per cent in Southern Region.

The population of the mostly rural southern provinces outside Maputo City also has more frequent and regular interactions with the capital, which facilitates the adoption of modern reproductive behaviour, already in place in Maputo City. In nineteenth century Europe such diffusion and frequent contacts with people outside the local social system (from a central source) was important in determining the onset of fertility decline (Watkins 1990, 1991).

Finally, when a society begins to abandon traditional reproductive patterns and adopt modern reproductive behaviour the relative effects of prolonged breastfeeding and postpartum abstinence in reducing fertility diminish while that of contraception becomes increasingly important (Frank and Bongaarts 1991). The analysis in Chapter 9 has shown that only in the Southern Region is there evidence that fertility decline has begun with the fertility-reducing effect of contraceptive use being higher (16%) than in Northern (3%) and Central (8%) regions, and that of postpartum infecundability being less (46%) than in Northern (67%) and Central (61%) regions.

10.3 What explains regional and provincial differences in fertility?

Consistent with earlier reports, the analysis in Chapter 4 found that fertility was highest in Central Region and lowest in Southern Region. In 1997 the TFRs in Central and Northern Regions were 11 and 6 per cent respectively higher than the national average, while the TFR for the Southern Region was 16 per cent lower than the national figure. All but two of the seven provinces in Central and Northern Regions had TFRs higher than the national average, while in all four provinces of the Southern Region the TFR was lower than the average. There was less variation in fertility between different provinces within a region, than between regions, reflecting the fact that socio-economic development indicators associated with fertility do not vary much within a region (see Appendix Table D4.1).

What explains regional differences in fertility? Why has the regional pattern of fertility remained unchanged over time? There are at least four possible factors: regional differences in infertility, labour migration, postpartum infecundability and marriage patterns. As a result of regional differences in the social behaviour, related to cultural influence, that propagates infertility-inducing diseases, fertility in Central Region is less depressed by infertility than that of either Northern or Southern Regions. As shown in Chapter 7, the prevalence of infertility is lowest in Central Region and highest in Northern Region and this pattern has remained unchanged. In Northern Region the high prevalence of infertility is related to the high tolerance of extramarital sexual relations of both sexes, and high marital instability. In Southern Region marriages are more stable and women's extramarital sexual relations are less tolerated. However, high male labour migration to the mines of South Africa and to Maputo City, as well as a high prevalence of polygyny, facilitates the spread of STDs that are associated with infertility. Migrants are likely to have frequent and unprotected contacts with other women and prostitutes while away and there is a strong possibility that STDs acquired in those encounters are passed on to their wives when they return or come to visit (see Chapter 7).

The fertility of Southern Region women is depressed further by migration through long periods of separation of the spouses. Miners usually spend most of the year away at work, visiting home only for a few weeks at the end of the year. For example, 19 per cent of women of reproductive age surveyed in 2000 by Alfeu (2001:41) in the district of Massinga (Inhambane province) had their husbands in the mines of South Africa. Alfeu (2001:41) also found that fertility was lower in households that had had a male member in the mines of South Africa than in households that had not. The results from the 1997 census show that 41 per cent (44% if Maputo City is excluded) of the heads of households in Southern Region were women, compared with only 25 per cent in Northern Region and 30 per cent in Central Region.

Also, as discussed in Chapter 8, the residents of the mostly rural provinces of Inhambane, Gaza and Maputo Province are more exposed to aspects of urban life than their counterparts in Central and Northern Regions, through association with return migrants or their own circulation between Maputo City and their rural areas, probably resulting in a high degree of adaptation to norms, values and behaviour associated with low fertility even while living in the village (see Brockerhoff and Yang 1994, for a number of sub-Saharan countries).

The analysis of the duration of postpartum infecundability in Chapter 6 (see Table 6.5) revealed a regional pattern that may explain part of the regional difference in fertility, at least the difference between Northern and Central Regions. The duration was found to be longer in Northern Region (22 months) than in either Central (20 months) or Southern (20 months) Regions.

Another possible explanation for regional differences in fertility is the difference in marriage patterns. Because women in Southern Region marry later than those in Northern and Central Regions (see Chapter 5), they are exposed to childbearing for a shorter period. In fact, it has been shown in Chapter 9, that the fertility-reducing effect of first marriage or sexual activity was highest in Southern Region. The analysis in Chapter 5 also found that marital instability was highest in Northern Region and therefore some period of exposure to childbearing was lost between the end of one marriage and beginning of the other, even with a quick remarriage, so that this may partly contribute to a relatively low TFR in Northern Region compared with Central Region where marriage is stable.

At the provincial level, the analysis of the association between demographic and socio-economic indicators and the TFR (see Chapter 4) found that among the demographic indicators age at first marriage and the contraceptive prevalence rate were the most significantly associated with TFR. In relation to socio-economic indicators, the analysis has shown that the most prosperous provinces had lower fertility than the more disadvantaged ones. This suggests that, in a quest for a sustainable population growth in Mozambique as outlined by the 1999 Population Policy (Republic of Mozambique 1999), socio-economic development is crucial.

10.4 How do socio-cultural and economic factors influence fertility behaviour?

The answer to this question was sought through analysis carried out in Chapters 4 to 8, where the effect of a number of cultural and socio-economic factors was investigated using both bivariate and multivariate approaches. The findings, which are summarised in Table 10.1, suggest that differentials in fertility are mainly explained by socio-economic factors (education, employment status), while for the individual proximate determinants, both socio-economic factors (education, employment status, place of residence) and cultural factors (religion, ethnicity, type of marriage) are important. Socio-economic development depresses fertility by creating low parental demand for children due to the increased costs of rearing children, and by increasing women's education, consequent late marriage, and employment of women outside the home; and by creating conditions that favour low and controlled fertility. The main highlights of these findings are discussed below.

10.4.1 Fertility

Bivariate analysis revealed considerable variation in TFR according to woman's education, employment status, religion, ethnicity, experiencing a child loss, marital status, region or province, and place of residence. However, the multivariate analysis undertaken to isolate the effect of each factor showed that only education, employment status and experience of child loss had statistically significant effects. The absence of a significant effect of region or province supported the aggregate (provincial level) analysis (Chapter 4), which found that uneven development between provinces was the main factor responsible for the fertility differences. On the other hand, the fact that ethnicity and religion did not have a significant effect on fertility once other factors had been controlled, is consistent with the 'characteristics hypothesis' postulating that ethnic or religious differences in fertility are artefacts of socio-economic differences among women members of different ethnic groups (Addai and Trovato 1999) or religious affiliations (Goldscheider 1971; Johnson 1993).

Table 10.1: Net effect of socio-economic characteristics on fertility and its proximate determinants

Dependent variables → / Socio-economic characteristics ↓	Fertility	Nuptiality			Postpartum infecundability			Infertility	Contraception
		Age at marriage	Polygyny	Marital dissolution	Breastfeeding	Postpartum amenorrhoea	Postpartum abstinence		
Education	Yes	Yes	Yes	No	No	No	Yes	No	Yes
Employment status/ Occupation	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes
Religion	No	No	Yes	Yes	No	Yes	Yes	No	Yes
Ethnicity	No	Yes	Yes	Yes	No	No	Yes	Yes	No
Place of residence	No	Yes	Yes	No	Yes	No	Yes	No	Yes
Number of unions	-	-	-	-	-	-	-	Yes	-
Age at marriage	Yes	-	No	Yes	-	-	-	Yes	-
Age 1st intercourse	-	-	-	-	-	-	-	Yes	-
Marital duration	-	-	Yes	-	-	-	-	-	-
Type of marriage	-	No	-	Yes	Yes	No	Yes	No	Yes
Parity	-	-	Yes	No	-	-	-	-	-
No. of surviving children	-	-	-	-	-	-	-	-	Yes
Proportion CEB dead	Yes	-	-	Yes	-	-	-	-	-
Region/province	Yes	Yes	Yes	Yes	No	No	Yes	No	Yes
Approval of FP	-	-	-	-	-	-	-	-	Yes
Exposure to media	-	-	-	-	-	-	-	-	Yes

Notes: 'Yes' means that statistically significant differences were found according to that particular variable; 'No' means that no statistically significant differences were found according to that variable; (-) the variable was not included in the model. See text for a discussion of particular effects and their direction.

Only secondary education was associated with low fertility. Primary education was either related to higher fertility or did not have any effect on fertility in comparison with no education. A pattern in which primary schooling has a positive or no effect on fertility is common in sub-Saharan Africa and Asia (Jejeebhoy 1995; Cleland and Jejeebhoy 1996; Agadjanian and Prata 2001) and indicates an early stage of fertility transition when secondary education leads women to replace traditional practices of fertility control by modern contraceptives practices, whereas primary education may break down the traditional forms of birth control without necessarily leading women to adopt modern contraceptive methods.

With regard to employment status the study found that women working in the modern sector had lower fertility than family-worker, self-employed and non-working women. This pattern of relationship between employment status and fertility reflects not only the high opportunity costs of having children for wage earner women, for whom having a child may mean interrupting their professional career, but also the greater compatibility of childbearing and childcare roles with women's unpaid or self-employment, which is mainly agriculture or informal trading taking place at home or nearby.

Differentials in fertility were also very significant according to women's child loss experience. The proportion of children ever born who died was found to be a powerful predictor of lifetime fertility, especially among older and/or rural women after other women's socio-economic characteristics had been controlled for. This indicates that couples in Mozambique may be having more children than desired to ensure that the desired number survives or to replace the deceased children, or that by shortening the birth intervals high childhood mortality leads to an increased women's life span exposed to the risk of having children (Palloni and Rafalimanana 1999; Makinwa-Adebusoye 2001). In agreement with this finding was the fact that in the bivariate analysis of provincial variation in fertility, the under-five mortality rate yielded one of the strongest associations with total fertility rate, explaining about 64 per cent of the variation (see Table 4.4).

10.4.2 Nuptiality

This study (Chapter 5) revealed that marriage in Mozambique was still early, with SMAM of 18 years in 1997, and almost universal: only 6 per cent of women 45-49 have never been married. This pattern is very different from that of some neighbouring countries such as

South Africa, Botswana and Namibia, where marriage is late and not universal, but it is similar to that of Malawi, Tanzania, Zambia and Zimbabwe. There are, however, regional differences: age at marriage is young and almost unchanged between 1980 and 1997 in Northern and Central Regions, and late and rising in Southern Region. However, the impact on fertility of late marriage in Southern Region is not strong because premarital fertility is high (see Chapter 4).

The results of the multivariate analysis indicated that higher levels of education, paid employment, urban residence and patrilinearity were positively associated with age at marriage. Religion did not have a significant effect. The findings on ethnicity contradicted the expectation of later marriage among matrilineal than patrilineal ethnic groups (see McDonald 1985; Lesthaeghe et al. 1989; Kaufmann and Meekers 1998). Marriage in patrilineal ethnic groups (Tsonga and Sena/Ndau) is centred on the payment of bride-wealth and since the value of such payments has continuously been rising, men in these ethnic groups need more time to gather the necessary resources to meet the costs of marriage than men in matrilineal ethnic groups (Macua and Lomwe/Chuwabo) where bridewealth payments are either non-existent or small. Thus, girls in patrilineal ethnic groups are forced to wait a long time to find a man with enough resources, or for their boyfriends to gather the resources, for the marriage. For the Tsonga, late marriage is also due to male migration to South Africa and Maputo City, which raises female age at marriage by creating a shortage of males of marriageable age.

Polygyny is widespread in Mozambique and its decline has been slow. As expected, higher levels of education for women, Catholicism, matrilineality and urban residence were found to reduce the likelihood of a woman being married to a polygynist. In contrast, being a non-Catholic, especially not having a religion, and being of patrilineal descent increased the chance of becoming polygynous. Women's occupation, husband's education and occupation were not strong predictors of polygyny, though white-collar men appeared to be more likely to be polygynist than men of other occupations. Also, women in marriages lasting for more than 5 years were more likely to be in polygynous marriages than women with shorter durations, and women in the Central Region were more likely than women in either Northern or Southern Region to be in polygynous marriages.

The findings on marital dissolution indicated that having wage employment, being of a non-Catholic religion (especially *Zione*), of matrilineal descent, marrying early and being a junior wife in a polygynous marriage increased the chance of experiencing a marital dissolution (having married more than once) for a woman. Education, place of residence and childlessness did not have any effect on the odds that a woman had married more than once. The fact that childlessness did not have any significant effect on marital dissolution was rather surprising because infertility is known to be a major factor for divorce in sub-Saharan Africa (Brandon 1990; Tilson and Larsen 2000). Perhaps the tendency of men, especially in patrilineal ethnic groups, to marry a second wife when the first is infertile (see Chapter 7) and the fact that marriage histories, which would give a more refined measure of divorce, were not available for this analysis are part of the explanation.

10.4.3 Postpartum infecundability

The analysis in Chapter 6 has shown that the long durations of breastfeeding, postpartum amenorrhoea and sexual abstinence have remained unchanged over time. On average, women in Mozambique breastfeed for two years, are amenorrhoeic for 17 months and abstain from sexual relation following a birth for 16 months. This leads to an average non-susceptible period of 20.4 months (see Table 6.5) with a 56 per cent contribution to the reduction in fertility from its potential to the observed level (see Table 9.5).

In terms of socio-economic differentials, more differences due to both socio-economic (education, employment status and place of residence) and cultural (ethnicity) factors were observed in the duration of postpartum sexual abstinence than in duration of either breastfeeding or postpartum amenorrhoea. Woman's education, woman's and husband's occupation, ethnicity, place of residence, contraception, type of marriage and region all had significant effects on the duration of the abstinence period, with shorter durations found to be associated with high levels of woman's education, practice of contraception, woman's and husband's white-collar occupations, monogamous marriage and Lomwe/Chuwabo ethnic background.

In relation to ethnicity, the expectation of longer durations of postpartum abstinence among patrilineal ethnic groups than matrilineal ones was not confirmed (see Table 6.4). Research in sub-Saharan Africa (Saucier 1972; P. Caldwell and J. Caldwell 1981; Lesthaeghe and Eelens 1989) has suggested that the widespread bridewealth payments, polygyny and high social control over women's sexual activity in patrilineal societies lead to long durations of postpartum sexual abstinence, while, in contrast, greater independence and initiative for women, related to less emphasis placed on bridewealth payments, in matrilineal ethnic groups lead to short durations. However, the findings in this study show that while this proposition may be valid for the matrilineal Lomwe/Chuwabo and the patrilineal Tsonga, it is certainly not so for the matrilineal Macua, implying that there are other important cultural factors causing ethnic variation even within matrilineality or patrilineality. Thus, caution should be used when making generalisations for a region as diverse as sub-Saharan Africa.

10.4.4 Infertility

The analysis undertaken in Chapter 7 has shown that the level of infertility in Mozambique is high, just below that observed in the high infertility countries of Central Africa, and that infertility makes a 15 per cent contribution to the reduction in fertility from its potential to the observed level (see Table 9.5). In 1997 primary infertility was estimated to range from 2 per cent in Central Region to 5 per cent in Northern Region with a national average of 4 per cent; while secondary infertility ranged from 16 per cent in Central Region to 25 per cent in Northern Region, with the national figure being 21 per cent. Such levels constitute not only an important public health issue but also a social problem since the stigma associated with infertility in Mozambique is still strong. Upton's (2001:354) observation in Botswana that 'infertility makes you invisible', and that by Dyer et al. (2002:1666) in South Africa that 'men leave me as I cannot have children' are probably valid in Mozambique as infertile women are banned from attending some social events, are likely to be divorced (although this was not statistically significant in Table 5.8) or abandoned by their husbands and receive different treatment from fertile women after death.

The study has also shown that the high prevalence of infertility, as well as its regional pattern, was related to the high prevalence of malaria and of risk-taking sexual behaviour in the population that lead to the spread of infertility-related diseases such as gonorrhoea, syphilis and other STDs. However, there are beliefs among many Mozambicans that infertility is a destiny or a punishment for bad behaviour or a transgression of customs or taboos, or a product of witchcraft. This suggests that more needs to be done not only in providing adequate treatment for infertility-related diseases, but also in making people, especially those in rural areas, aware of the possible consequences of these diseases for their reproductive lives.

It has also been shown that infertility, as measured by the proportion childless, had an increasing trend until 1970 when it started to decline. The decline in infertility from 1970 was largely attributed to a reduction in venereal diseases, malaria and other diseases, resulting from health improvements that took place after the country's independence in 1975.

Bivariate and multivariate analyses showed that there was more variation in secondary infertility than in primary infertility, and that woman's parity, age at first sexual intercourse and first marriage, number of unions and ethnicity were the main factors associated with infertility in Mozambique. There was a very strong negative association between parity and secondary infertility, with a significant proportion of women becoming secondarily infertile at a low parity, many after the first child; this suggests that poor access to adequate health care and skilled assistance during the first pregnancy and delivery are important causes of secondary infertility. The risk of secondary infertility was particularly high among women who began their sexual activity or marriage very young, implying that they may have become pregnant for the first time while physically immature and with an increased risk of having childbirth complications that may lead to subsequent infertility. These findings suggest that adequate assistance at delivery should be provided, and policies should be implemented to increase the age at first marriage or first pregnancy, through keeping girls in school longer and promoting contraception among adolescents, which would reduce early marriage due to unwanted pregnancy; these measures would significantly reduce the level of secondary infertility.

Women who have been married twice or more were twice as likely to be infertile. This implies both that marital instability facilitates the spread of venereal diseases that are associated with infertility by exposing women to multiple sexual partners, and also that infertile women are more likely than fertile women to be divorced (although this was found to be not statistically significant in Table 5.8) or abandoned by their husbands.

Regarding ethnicity, the study found that infertility was highest among the matrilineal Macua and lowest among the patrilineal Sena/Ndau. This is consistent with the argument that infertility in sub-Saharan Africa is associated with high sexual freedom, especially the tolerance of premarital and extramarital sexual relations (Caldwell and Caldwell 1983, 2000). The Macua have most of the attributes that are associated with high risk of infertility: early age at first sexual intercourse and first marriage, high marital instability and encouragement of female extramarital sexual relations whereas, in contrast, the Sena/Ndau, despite having the highest prevalence of polygyny, have more stable unions and less tolerance of extramarital sexual relationships. It is important to note here that, although it appears that the difference between the Macua and the Sena/Ndau revealed a matrilineal-patrilineal dichotomy, the multivariate results showed no difference in the odds of both primary and secondary infertility between the patrilineal Tsonga and the matrilineal Lomwe/Chuwabo or the 'mixed descent system' of 'Other local ethnic' background, suggesting important differences within both matrilineality and patrilineality.

10.4.5 Contraception

The analysis in Chapter 8 showed that, although knowledge about contraception is fairly high, over 60 per cent of all women, its use remains low at 6 per cent of all women currently using any method of contraception, with only 5 per cent using a modern method, 5.1 per cent of married women and 8.7 per cent of unmarried ever sexually active women (see Table 8.2). This level of contraceptive use is the second lowest in Southern Africa (see Table 1.1) and is partly explained by a weak family planning program (Ross and Stover 2001), especially its inability to make family planning services available to all potential users. A high desired family size and opposition to the family planning program by women and their husbands or partners have also helped to keep contraceptive use at a low level. Thus, contraceptive use in Mozambique makes only a 9 per cent contribution to the reduction in fertility from its potential to the observed level (see Table 9.5).

Chapter 8 also found that contraceptive use is higher in Southern Region than in Central and Northern Regions and these differences could not be accounted for by the socio-economic variables used in the multivariate models. Part of the explanation for these differences may lie in differential access to family planning services due to differential socio-economic development that determines the availability of health facilities. Southern Region includes Maputo City where socio-economic conditions are the best in the country, and its importance in spreading modern reproductive behaviour to other parts of the Southern Region is greater than the influence of the relatively small cities in Central and Northern Regions.

The analysis of differentials found that education, urban residence, modern employment and monogamous marriage increased the likelihood of using both traditional and modern contraceptives, while Zionism, 'other' religion and no religious affiliation were found to have a negative effect on contraceptive use in comparison with the Catholic, Protestant and Muslim religions. The findings on religion are consistent with the view that by being socially heterogeneous, the larger church denominations are more likely to facilitate the spread of contraceptive innovation to their members than the smaller churches, because the latter tend to be socially homogeneous (Agadjanian 2001b). Unlike the case with religion, no significant differences were found according to ethnic affiliation, except for the Portuguese/foreign, an elite group comprising Mozambicans whose first language is Portuguese (97%) or other foreign language (3%), who had significantly higher odds of using contraception than the local ethnic groups.

The multivariate analysis also found a strong positive association between the number of surviving children and contraceptive use. Although this finding may be surprising, as in most African countries spacing appears to be a more important reason for contraceptive use than stopping (National Research Council 1993a; Cohen 1998), it reflects the fact that the non-susceptibility period is still long, averaging 20.4 months. In Mozambique only a small minority of high-status women use contraceptives for delaying the onset of childbearing or to space births. The vast majority of women, especially the uneducated and those living in rural areas consider using modern contraception only when their desired family size has been reached, or when experiencing a reproductive health problem such as persistent miscarriages or delivering babies that do not survive. For these women, who are older and hence more likely to have reached their desired number of children, the use of contraception is mainly for stopping purposes.

Many studies in sub-Saharan Africa have noted that husband's opposition to family planning and the absence of spousal discussion about this topic are the main barriers for successful family planning programs in the region. Apart from confirming the impact of these factors, this study also found that opposition to contraceptives from the women themselves was stronger than that from their husbands (see Tables 8.7 and 8.8, Appendix Tables G8.1 and G8.2). This suggests that women are poorly informed about modern contraception and, therefore, more effort is needed in providing correct information about these methods. With regard to husband's opposition, the fieldwork conducted by the author in Inhambane suggested that such opposition was partly because they too are ill-informed. Thus, family planning in Mozambique is likely to gain acceptance among husbands if they are also targeted by family planning campaigns.

Finally, as other studies have also reported, this study found that exposure to mass media family planning messages played an important role in women's contraceptive behaviour. Women who were exposed to at least one media source of family planning messages were more likely to have used contraception than women who were not exposed to any media source of contraceptive information. However, media exposure did not have any effect among married women, partly because family planning messages in Mozambique are directed to HIV/AIDS prevention (condom use promotion) and do not emphasise fertility control within marriage. Thus, family planning messages should also be directed to fertility control within marriage, by promoting contraceptive methods that are acceptable for couples.

10.5 The future of fertility and some policy implications

As mentioned in Chapter 1, the issue for the future of fertility may no longer be about the initiation of fertility decline but its magnitude and sustainability. Thus, both the National Institute of Statistics (INE 1999d) and the United Nations 2000 Revision medium variant (United Nations 2001c) population projections have forecast a decline in total fertility rate in Mozambique for the next 20 years by at least 0.6 children per woman per decade (see Table 10.2). On the basis of the present study, however, fertility in Mozambique may not be expected to decline as fast as suggested by Table 10.2, unless there are important improvements in the family planning program. The availability of contraceptives remains very limited as health facilities, the main or perhaps the only service delivery points, provide poor coverage of the country. The Community-Based Distribution (CBD) strategy which has been successful in other sub-Saharan countries such as Zimbabwe (Thomas and Maluccio 1996; Guilkey and Jayne 1997) and Kenya (Toroitich-Ruto 2001) has not yet been adopted in Mozambique. Regional differences in fertility trends are likely to widen as better socio-economic conditions in Southern Region make the family planning program more likely to succeed there first, leading to a much faster fertility decline, than in Northern and Central Regions.

This scenario has important policy implications, as reducing rapid population growth through controlled fertility is the main aim of the 1999 National Population Policy (Republic of Mozambique 1999). It was shown in Chapter 9 that the largest fertility-reducing factor in Mozambique is the long duration of the non-susceptible period due to prolonged amenorrhoea and sexual abstinence. Although it has remained unchanged in recent years, there are signs, especially among educated and urbanised women, that the trend towards shorter durations of postpartum amenorrhoea and sexual abstinence has started. Thus, to compensate for the shortening of the postpartum infecundability period and induce a decline in fertility, the use of modern contraceptives has to increase.

Table 10.2 Projected total fertility rate, Mozambique 2000-2020

Institution	2000-2005	2005-2010	2010-2015	2015-2020
National Institute of Statistics[a]	5.6	5.3	5.0	4.6
United Nations (Medium variant)[b]	5.9	5.4	5.0	4.5

Sources: [a] INE (1999d:Table 26); [b] United Nations (2001c:332).

On the basis of findings in Chapter 8, efforts should be made to make contraception more available especially in rural areas, as, although a fairly high proportion of women know of contraceptive methods, only a very small proportion use them. Also, since there is opposition to family planning by women themselves and by their husbands or family members, information campaigns should be intensified. In particular, these campaigns should be designed to target distinct groups of potential users of contraception: adolescents for whom contraception may delay marriage by avoiding unwanted premarital pregnancies, and married women who may need contraception for spacing and stopping childbearing. It is also important that family planning campaigns target men because most of the opposition to family planning by husbands is due to lack of correct information.

The media should increasingly be used in spreading the information about birth control. In particular, contraceptive messages should also promote methods that are acceptable for use within marriage. This is important because this study (Chapter 8) has shown that current family planning messages, which put more emphasis on HIV/AIDS prevention by promoting the use of condoms in occasional sexual encounters, has not had any influence in increasing contraceptive use among married women.

High prevalence of STDs, childbirth and post-abortion infections, and malaria appear to be the main factors associated with infertility in Mozambique. Given that these diseases can be prevented or easily cured, infertility can be considerably reduced by improved access to health care, particularly the provision of skilled assistance at childbirth. People should also be encouraged to seek treatment of STDs at hospitals rather than from traditional healers.

It was also found that early age at marriage increased the likelihood of infertility. Thus, programs aimed at preventing early marriage should be given priority. Girls should be kept at school longer not only by making education more accessible for poor and rural people, but also by preventing unwanted pregnancies through increased availability of contraceptives for adolescents.

10.6 Directions for future research

This study has implications for future fertility research in Mozambique as it has unveiled aspects of reproductive patterns that could not be fully explored, mainly because of data limitations, especially the fact that the fieldwork only covered one ethnic group. While the role of socio-economic development factors was broadly consistent with previous research in sub-Saharan Africa, the effects of cultural customs, values and practices on fertility behaviour need further investigation. For example, it is still unclear why matrilineal ethnic groups marry at an earlier age than the patrilineal groups, while research elsewhere in sub-Saharan Africa suggests otherwise. Also, the mechanism through which ethnicity, in particular the descent system, affects the duration of postpartum abstinence needs further research.

Finally, this study did not take into account the effect of HIV/AIDS on fertility. Mozambique is surrounded by HIV/AIDS high prevalence countries and its prevalence rate is expected to rise from 13 per cent in 2001 (UNAIDS/WHO 2002) to 17 per cent in 2004 (Ministério da Saúde et al. 2000). Studies in sub-Saharan Africa suggest that behavioural changes in response to HIV/AIDS can lead to a decline or even an increase in fertility (Gregson 1994; Gregson et al. 1997, 1998; Rutenberg, Biddlecom and Kaona 2000; Grieser et al. 2001; Ntozi 2002). Fertility may be reduced by increases in secondary infertility and foetal loss brought on by the disease and its associated opportunistic infections, delayed onset of sexual relations and marriage, increased divorce and widowhood, reduced remarriage and increased condom use; on the other hand, increased infant mortality, reductions in breastfeeding to avoid mother-to-child HIV transmission, and a reduction in STDs prevalence due to fewer sexual partners may lead to an increase in fertility. A focus on future research could be to explore how the increasing levels of HIV/AIDS prevalence will affect fertility trends.

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A1.1 Note on statistical models used in the analysis

Poisson Regression Model

The Poisson regression model allows the analysis of the effect of continuous independent variables on a discrete (integer) and non-negative dependent variable. In the Poisson model the probability that N_i equals n is given by

$$\Pr(N_i = n) = \lambda_i^n / n! \exp(-\lambda_i)$$

where N_i is the number of children ever born, and λ_i is the expectation (and also the variance) of the random variable N_i and can be expressed as

$$\lambda_i = \exp(b_0 + X_i \beta$$

where β is a coefficient vector, b_0 a constant that defines the expected number of children ever born for a woman with X_i set to zero, and X_i the independent variables (For more details see Winkelmann and Zimmermann 1995; Nguyen-Dinh 1997).

Logistic Regression Model

The logistic regression model is used when the dependent variable is dichotomous to determine the relative probability of an individual with specific characteristics belonging to one of the two categories of the dependent variable. The logistic regression model estimates a linear model of the form:

$$\ln(P_i/1-P_i) = b_0 + b_i X_i,$$

where P_i is the estimated probability of a particular individual with a given set of characteristics, X_i, being in one category of the dependent variable; b_0 is a constant that defines the probability P_0 for an individual with all X_i set to zero; and b_i are the estimated coefficients. The ratio $(P_i/1-P_i)$ is the odds ratio of women with the given set of characteristics being in one category versus being in the other. The exponential of each b_i ($\exp[b_i]$) gives the relative odds of being in one category for those individuals with characteristic X_i relative to those in the reference or omitted category (Halli and Rao 1992:101-111; Retherford and Choe 1993:121-142).

Multinomial Logistic Regression Model

The multinomial logistic regression model is the logistic regression model adapted to the case when the dependent variable has three or more categories. Considering the case of three categories, and if

P_1 is the probability of being in category 1;

P_2 is the probability of being in category 2 and;

P_3 is the probability of being in category 3,

The multinomial model then consists of the following equations:

$$\ln(P_1/P_3) = b^1_0 + b^1_i X^1_i,$$

representing the relative probability of being in category 1 versus category 3;

$$\ln(P_2/P_3) = b^2_0 + b^2_i X^2_i,$$

representing the relative probability of being in category 2 versus category 3,

With

$$P_1+P_2+P_3=1.$$

The interpretation of the resulting odds ratio ($\exp[b^i_j]$) is the same as in the logistic regression (see Halli and Rao 1992; Retherford and Choe 1993).

Proportional Hazards Model

The proportional hazards model is a multivariate life table. As in a standard life table, it is assumed that there is a hazard (or risk) at each duration (or age, if duration is time since birth) t of the occurrence of the event of interest (e.g. first marriage, weaning etc.). The model allows the risk to depend on personal characteristics. If $\lambda(t;\underset{\sim}{z})$ is the hazard (risk) function at time t for a woman with the characteristics represented by the covariate $\underset{\sim}{z}$, the proportional hazards model is given by (Halli and Rao 1992:152):

$$\lambda(t;\underset{\sim}{z}) = \lambda_0(t)\exp(\underset{\sim}{z}\beta)$$

where $\lambda_0(t)$ is an arbitrary unspecified baseline hazard function for time t, and β is a vector of parameters. The hazard function $\lambda(t)$ is a product of an underlying time-dependent risk

$\lambda_0(t)$ (baseline hazard function) and another factor $\exp(z\beta)$ that depends on the covariates. The baseline hazard function represents the hazard function for a woman whose covariate categories have the value zero. Thus, $\exp(z\beta)$ represents the relative risk of experiencing the event of interest for women of other groups in relation to women in the baseline group.

The proportional hazards model assumes that the hazard functions are proportional, that is, the relative risk of experiencing the event of interest between women in the different categories of a particular independent variable is proportional to the others. In this analysis the proportionality was tested by visually inspecting the log-log survival function plotted for every category of each independent variable (see Retherford and Choe 1993:196-198).

B2.1 Note on the indices of age data evaluation

Whipple, Myers and Bachi Indices

Whipple's index measures the preference for reporting ages ending in digits 0 and 5 in the age range 23 to 63 years old. Young and very old ages are excluded because they are more strongly affected by other types of reporting errors than by preference for specific terminal digits and, therefore, the assumption of equal decrements from age to age is less applicable (Shryock et al. 1973:203-206). The index varies between 1 (or 100), representing no preference for 0 or 5, and 5 (or 500) if only digits 0 and 5 were reported. Whipple's index has the advantage of being easy to compute but, apart from measuring digit preference only, it measures the preference for two digits only. As cultural aspects may influence the preference for a particular digit, it is possible that the degree of preference for 0 and 5 varies among populations and other digits may even be more attractive than 0 or 5 (UNFPA 1993). Furthermore, if the preference is for year of birth rather than age itself, the heaping may be observed in other digits as well. Myers's blended index takes this into account and measures the preference or avoidance of all ten digits.

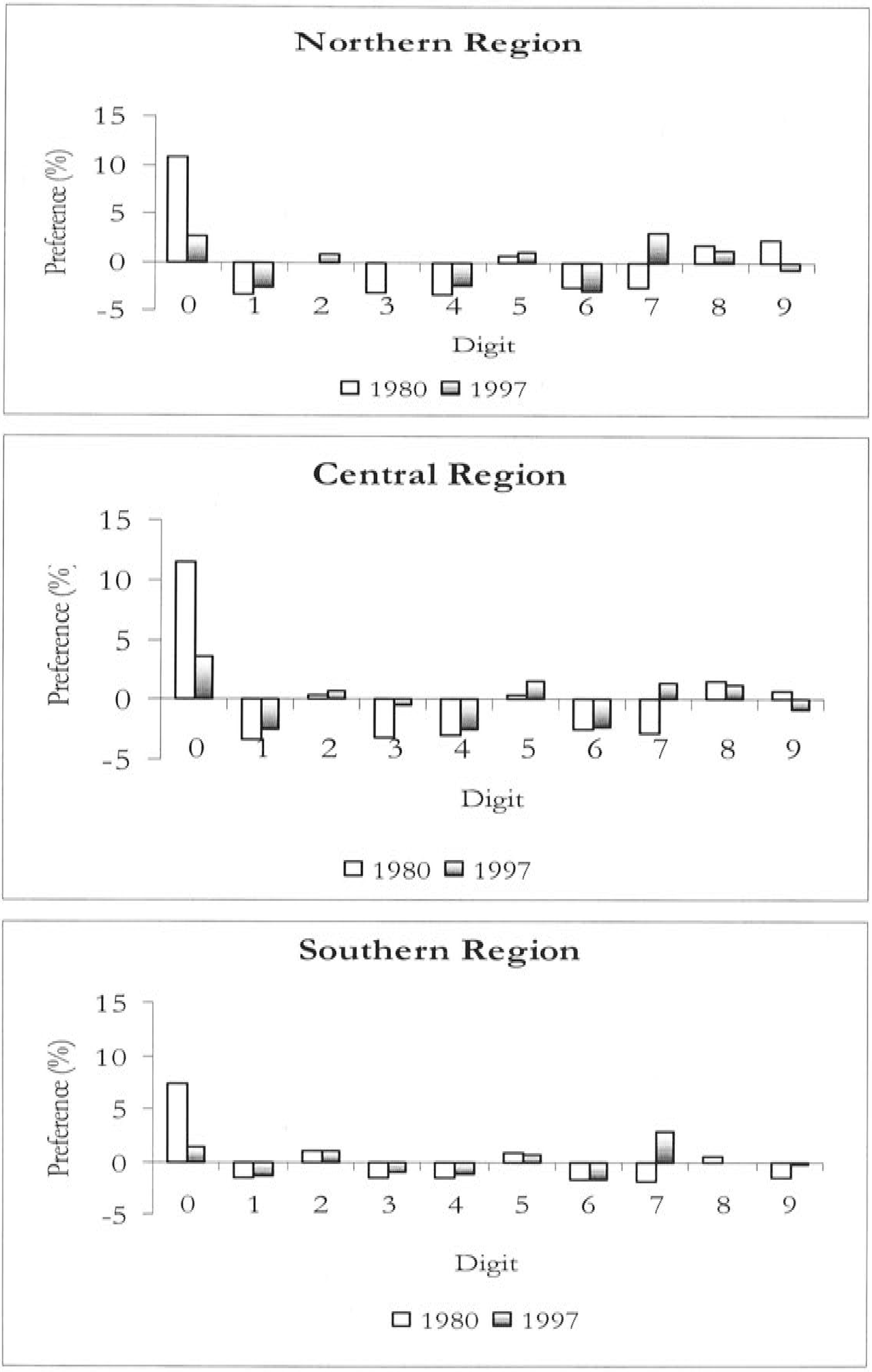
The Myers index assumes that, in the absence of error due to digit preference, the population recorded for ages ending in each digit would account for 10 per cent of the total population. Thus, indices in excess of 10 per cent indicate a tendency toward preference for a particular digit and indices below 10 per cent indicate a tendency toward avoidance of a particular digit (Shryock et al. 1973:206-211). Myers's summary index of preference for all terminal digits is taken as one-half of the deviation from 10 per cent, regardless of sign, and it represents the minimum proportion of people for whom an age with an incorrect final digit was reported. Myers's index ranges from 0 (no heaping) to 180 (if all ages were reported at a single digit). Myers' index is not theoretically precise since the exact conditions for a score indicating no digit preference are not defined. This deficiency is overcome by the Bachi index, which involves applying Whipple's method repeatedly to determine the extent of preference for each final digit. Like Myers's index, the Bachi index is equal to the sum of the positive deviations from 10 per cent, and it has a theoretical range from 0 to 90 (UNFPA 1993; Shryock et al. 1973).

The United Nations age-sex accuracy index

The United Nations (UN) developed an overall measure of accuracy of distribution that combines age and sex ratios. The United Nations age-sex accuracy index is derived from the computation of sex ratios and age ratios for five-year age groups up to age 70. The average of successive differences of sex ratios between one age group and the next and the average of the deviations from 100 of age ratios for either sex are taken regardless of sign, and then, the index is taken as the sum of (i) three times the average of sex ratio differences and (ii) the two average deviations of age ratios from 100 (UNFPA 1993; United Nations 1952). The United Nations classifies the index as 'accurate', 'inaccurate' or 'highly inaccurate' if the index is under 20, 20 to 40, or over 40, respectively. In the absence of sex-selective migration and underenumeration, the UN index, 'provides a measure of the net errors in age reporting only to the extent that the patterns of misreporting differ for the two sexes' (Ewbank 1981:31). However it does not give an accurate estimate of age mis-reporting among children aged 0-4, since reporting errors in this age group are apt to be similar for the two sexes (Ewbank 1981). The UN index has also been criticised for failing to take into account the irregularities arising from real disturbances of the population structure, due to such factors as war, temporary birth deficits or migration. However, it has the advantage over Whipple's, Myers's and Bachi's indices of giving an indication of the quality of data in the form in which they are used for most purposes, that is in five-year age groups (UNFPA 1993).

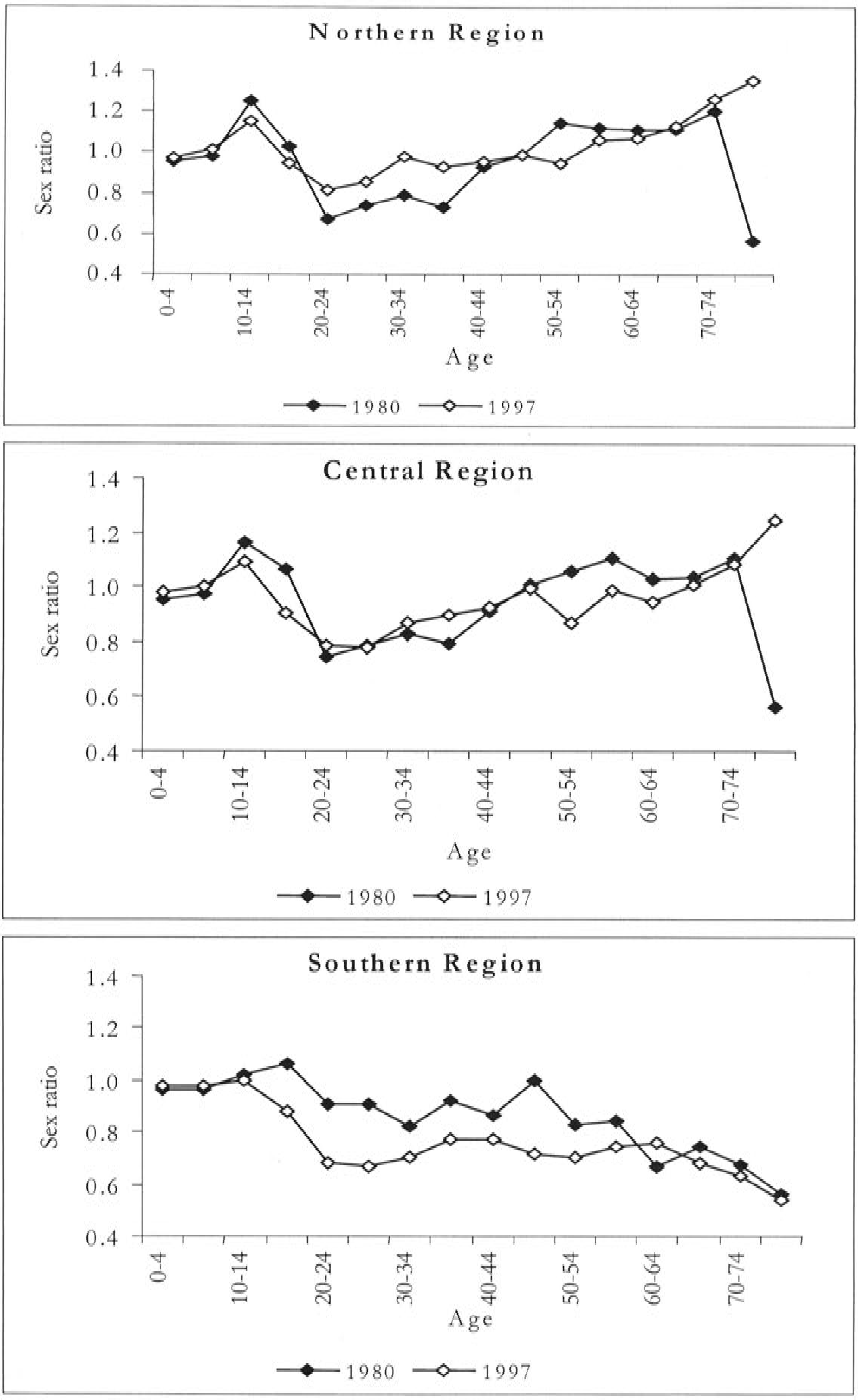
B2.2 Graphs for Chapter 2

Figure B2.2.1 Myers preference for specific digits, females, Mozambique 1980 and 1997



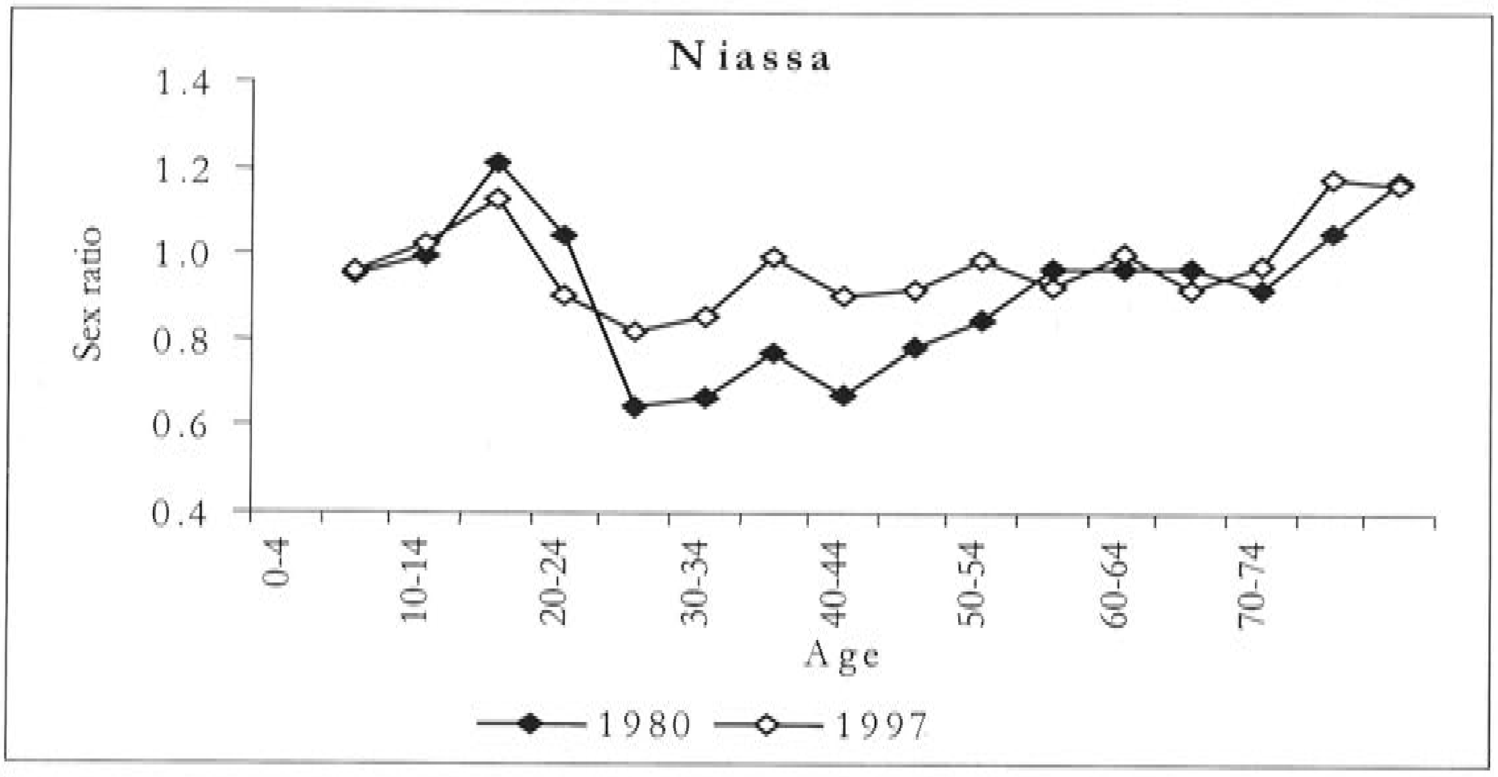
Source: Computed from 1980 and 1997 Censuses

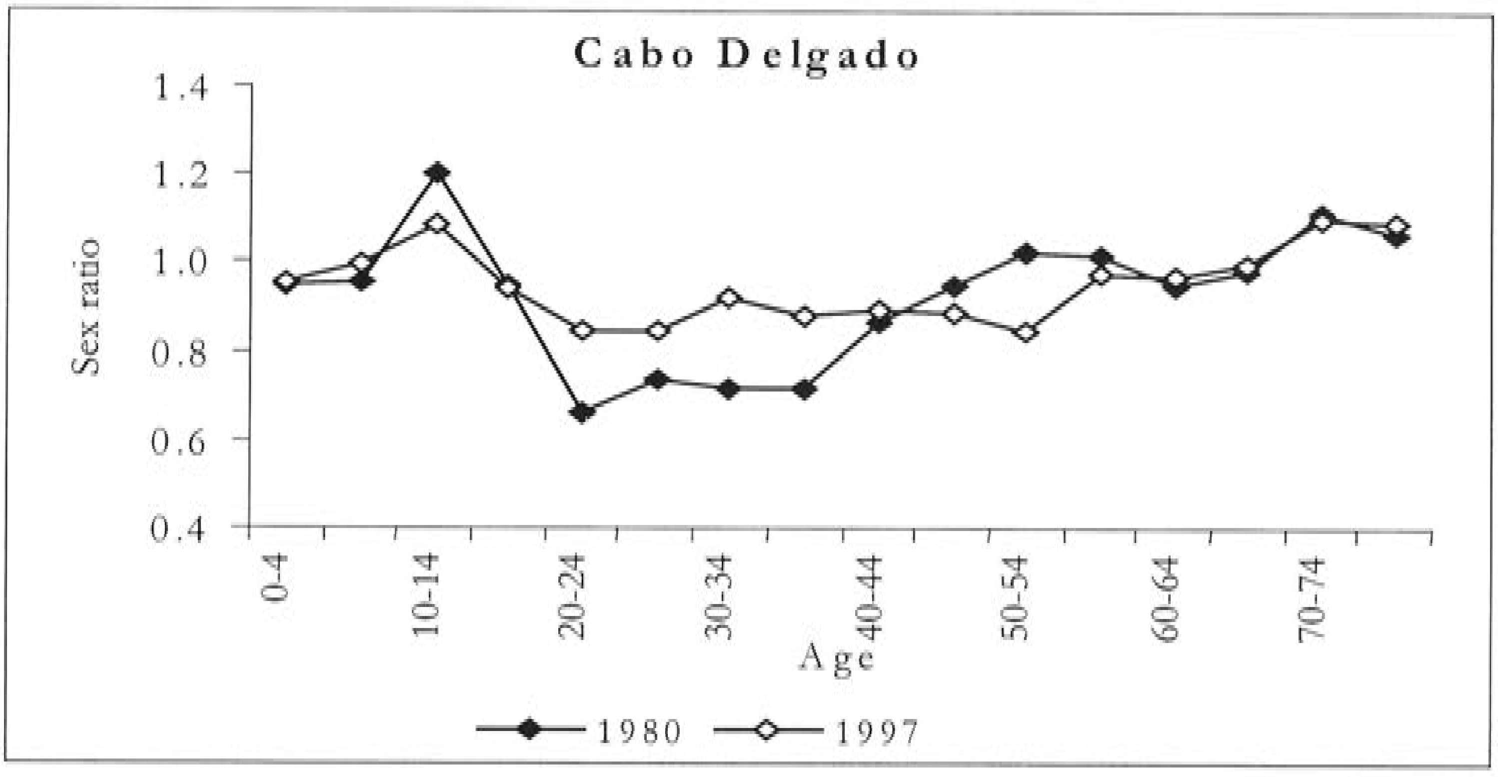
Figure B2.2.2 Sex ratios by age, Mozambique 1980 and 1997

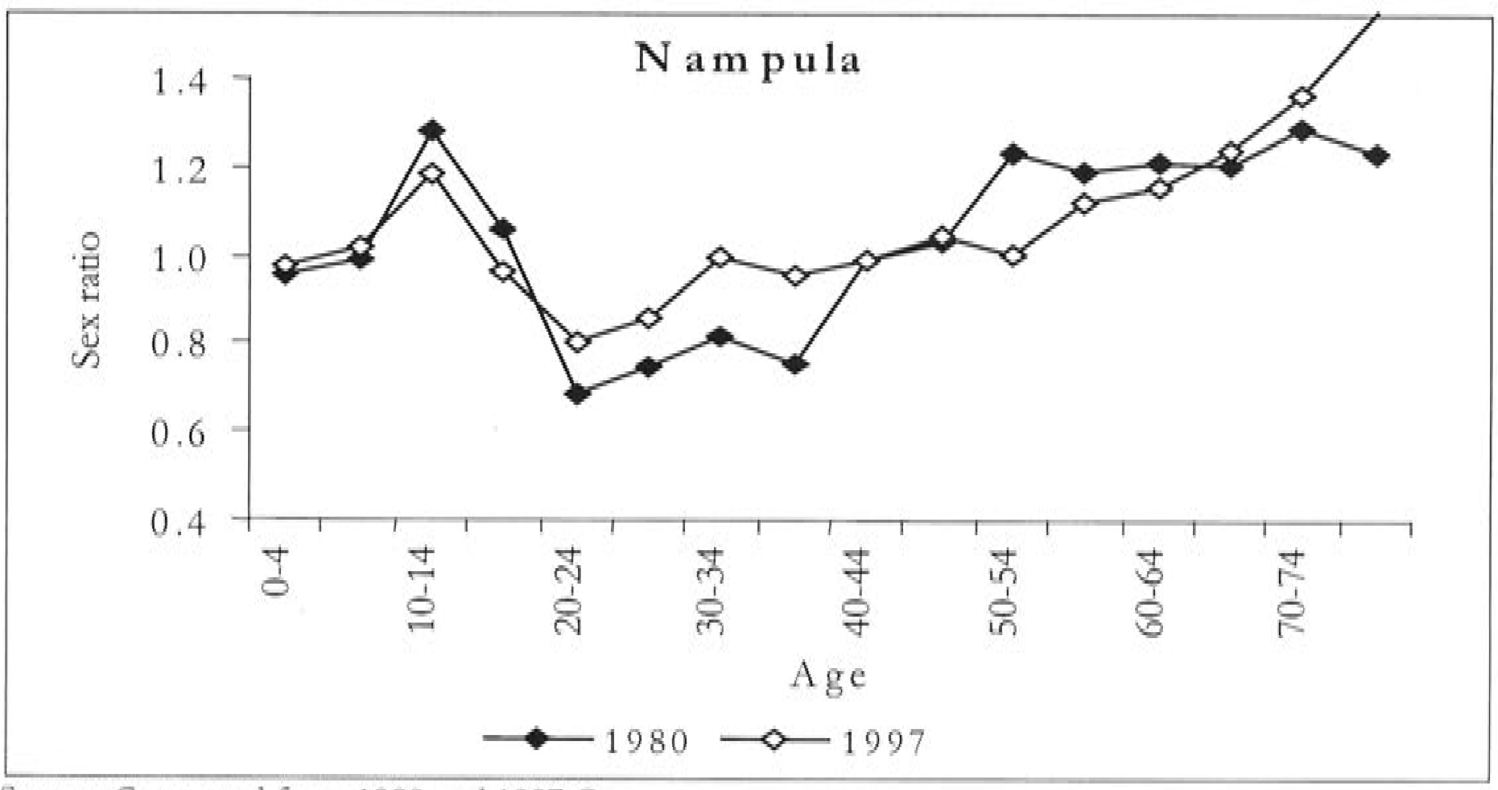


Source: Computed from 1980 and 1997 Censuses

Figure B2.2.2 Continued...

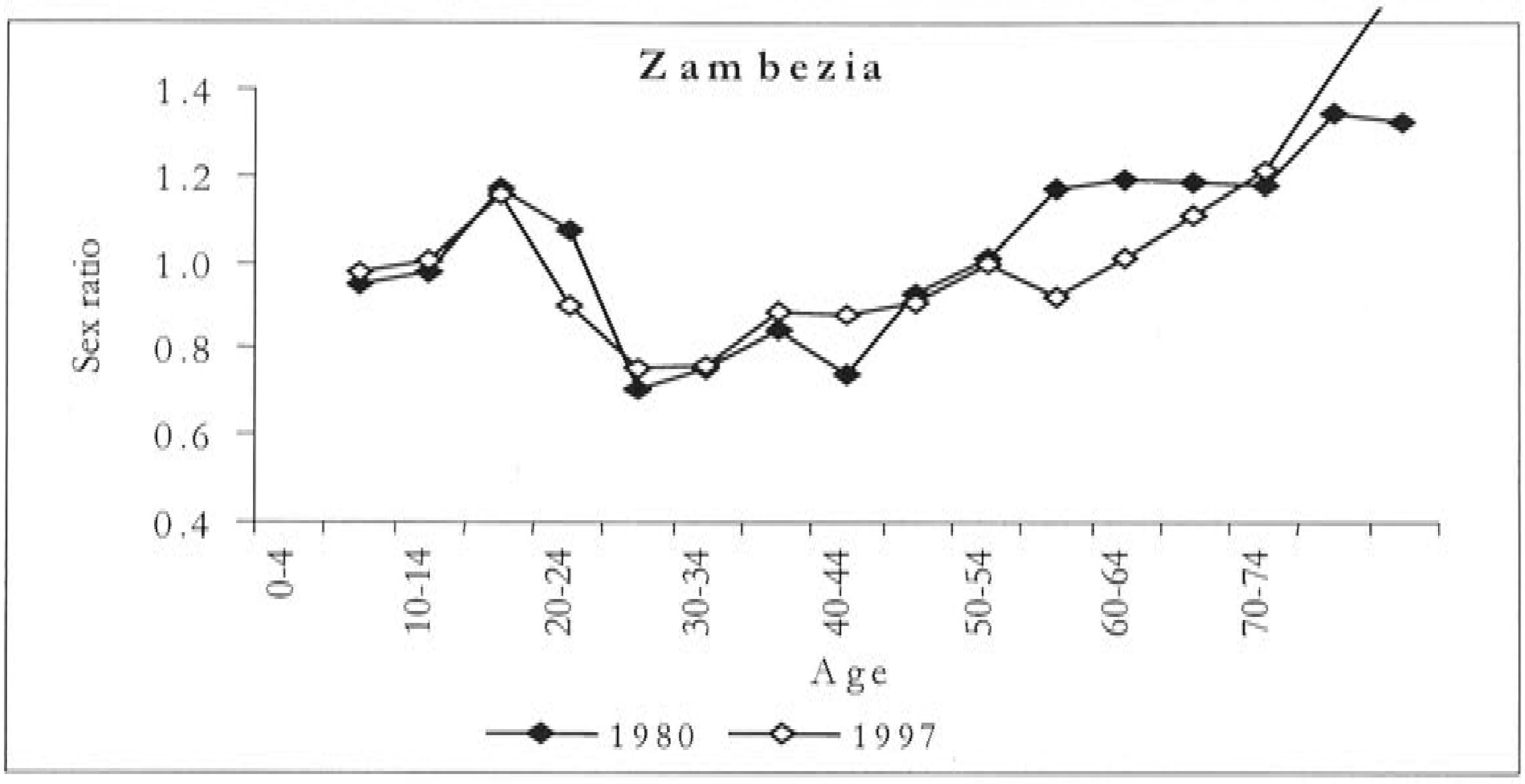


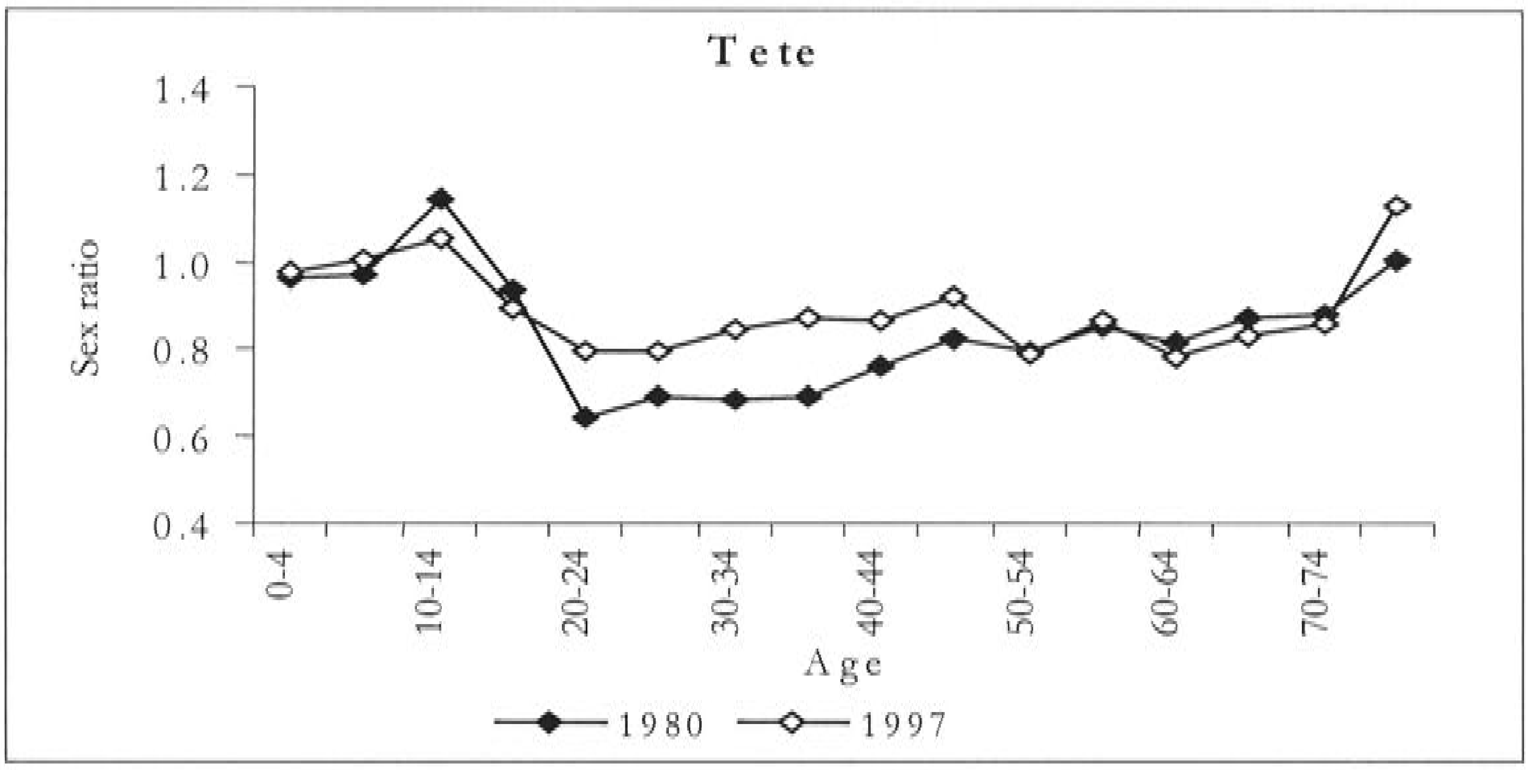


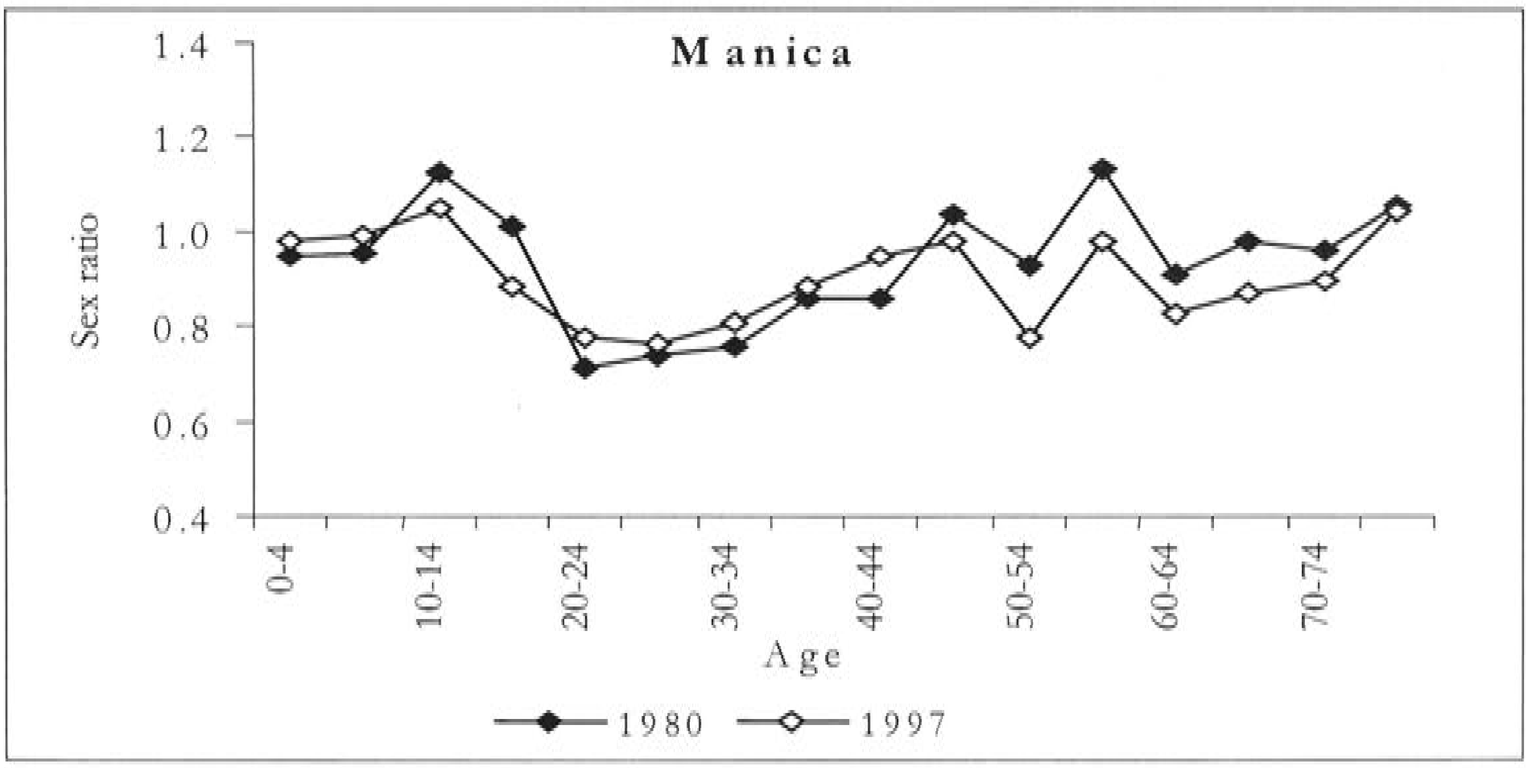


Source: Computed from 1980 and 1997 Censuses

Figure B2.2.2 Continued…

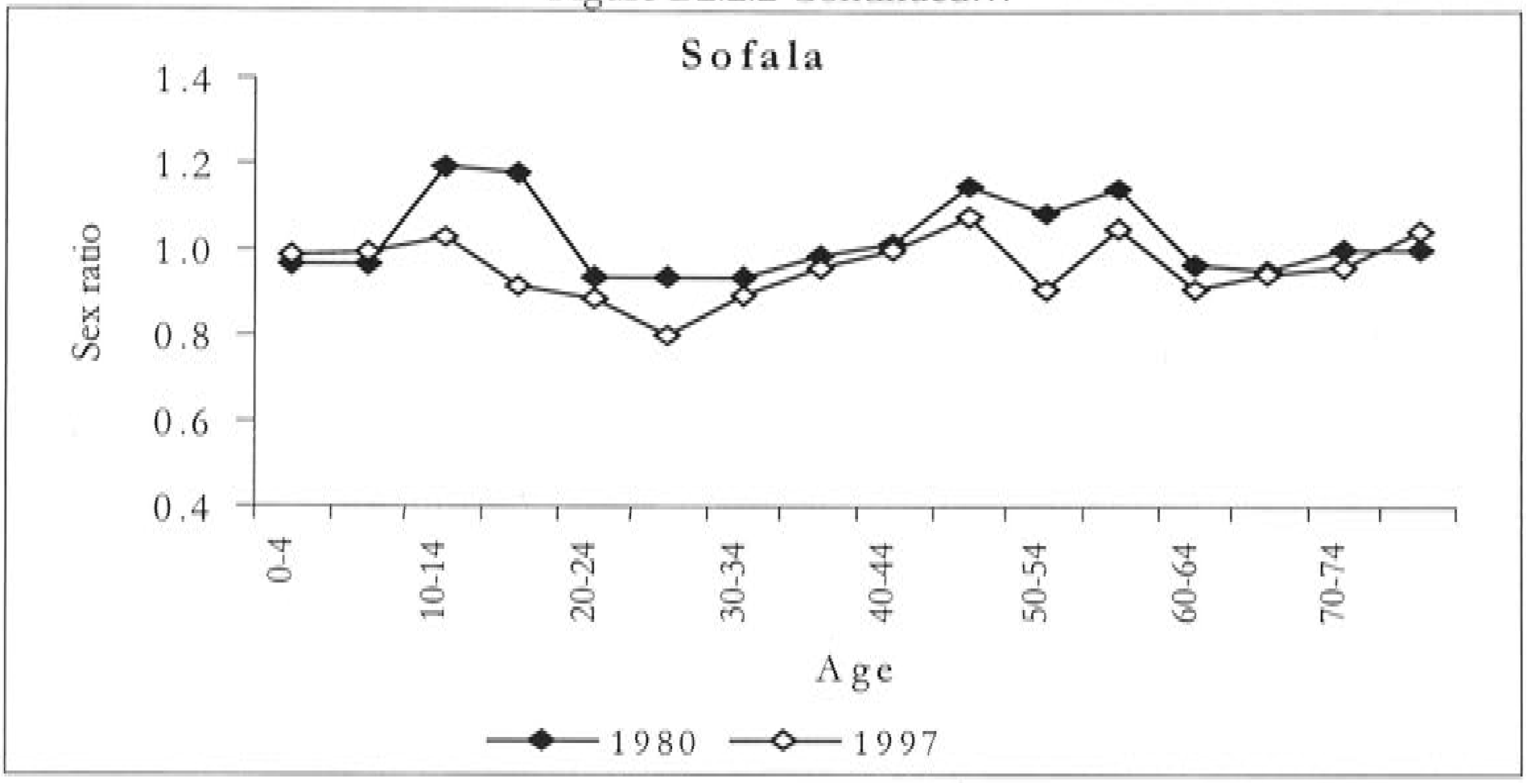


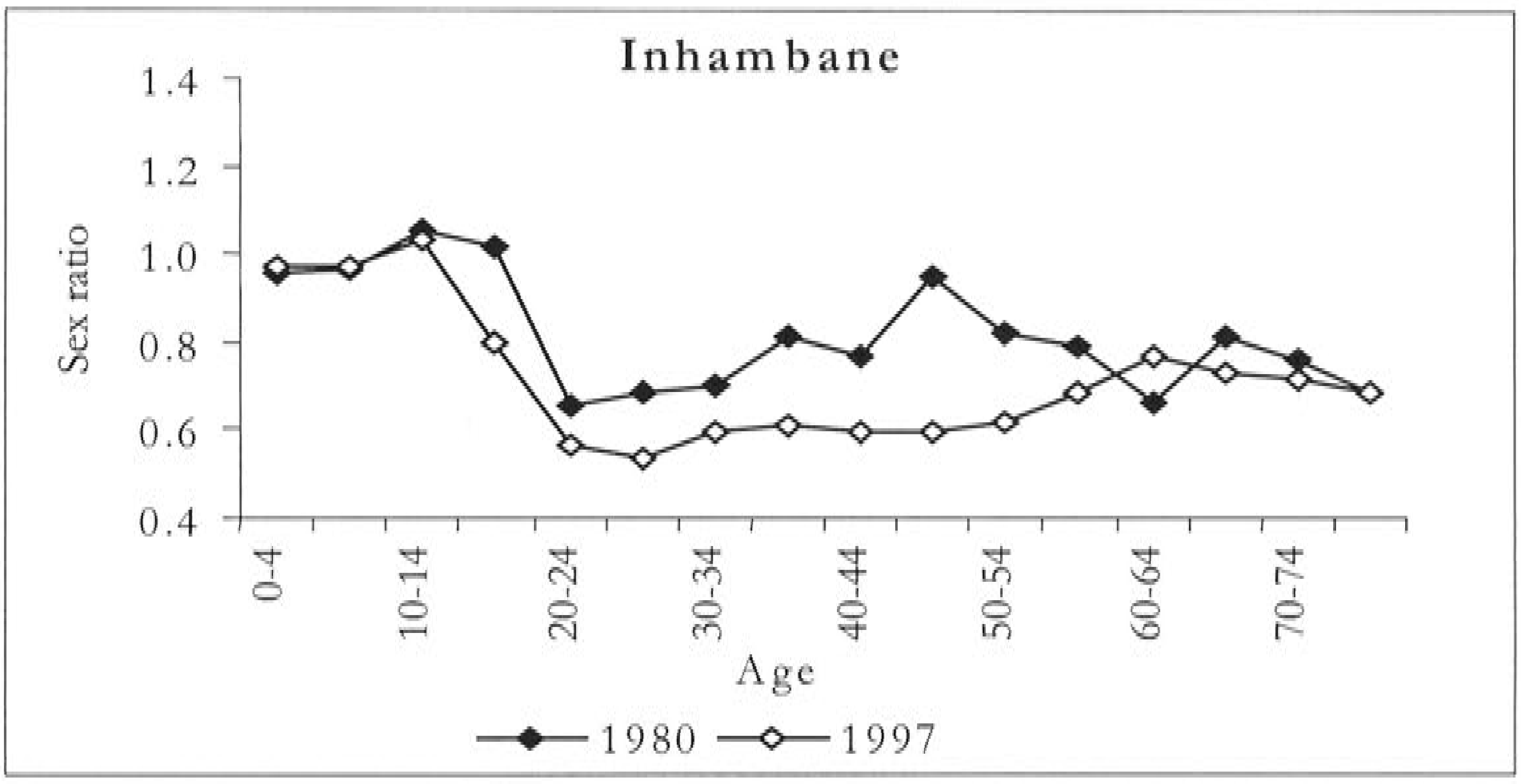


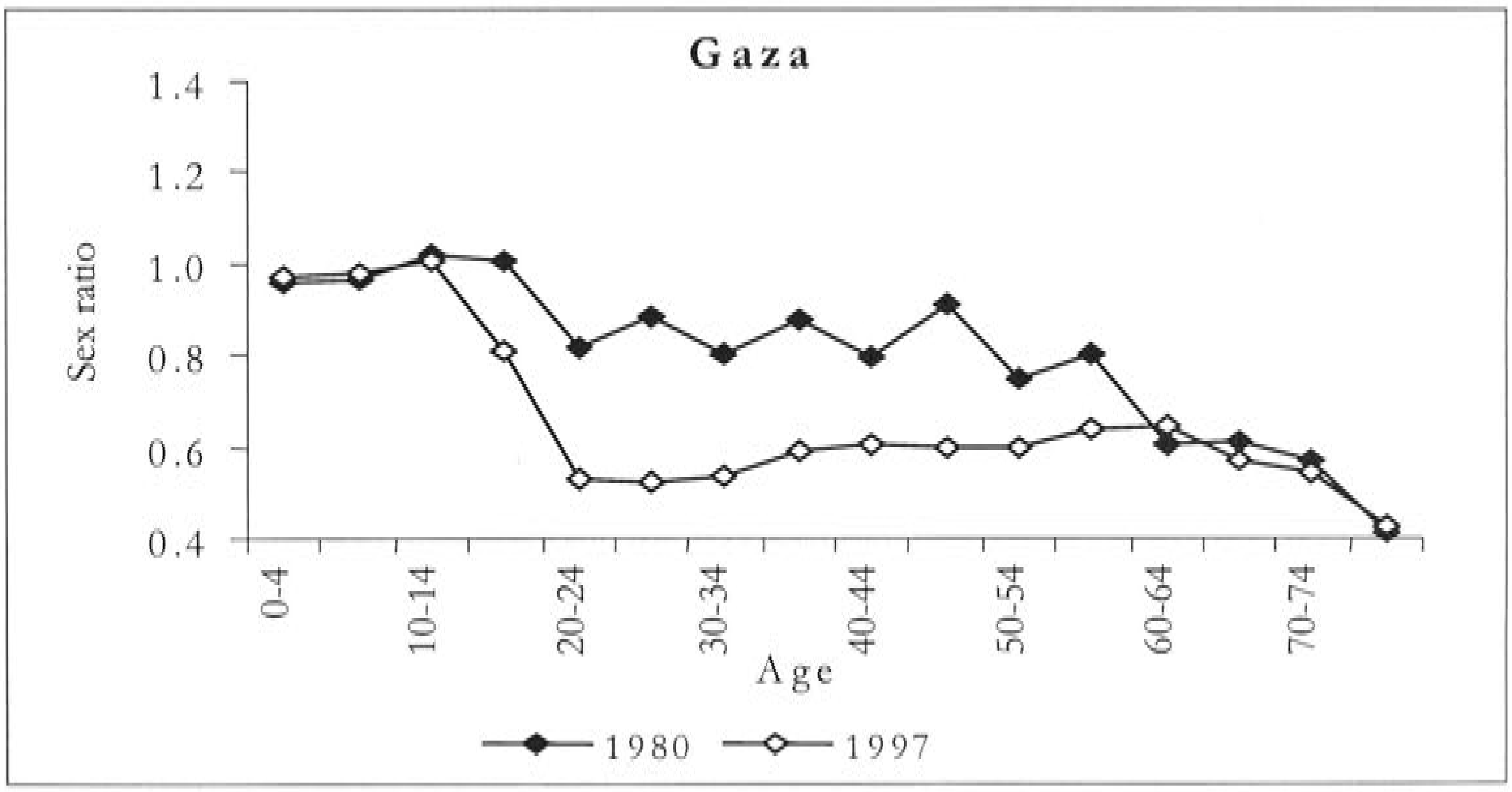


Source: Computed from 1980 and 1997 Censuses

Figure B2:2.2 Continued…

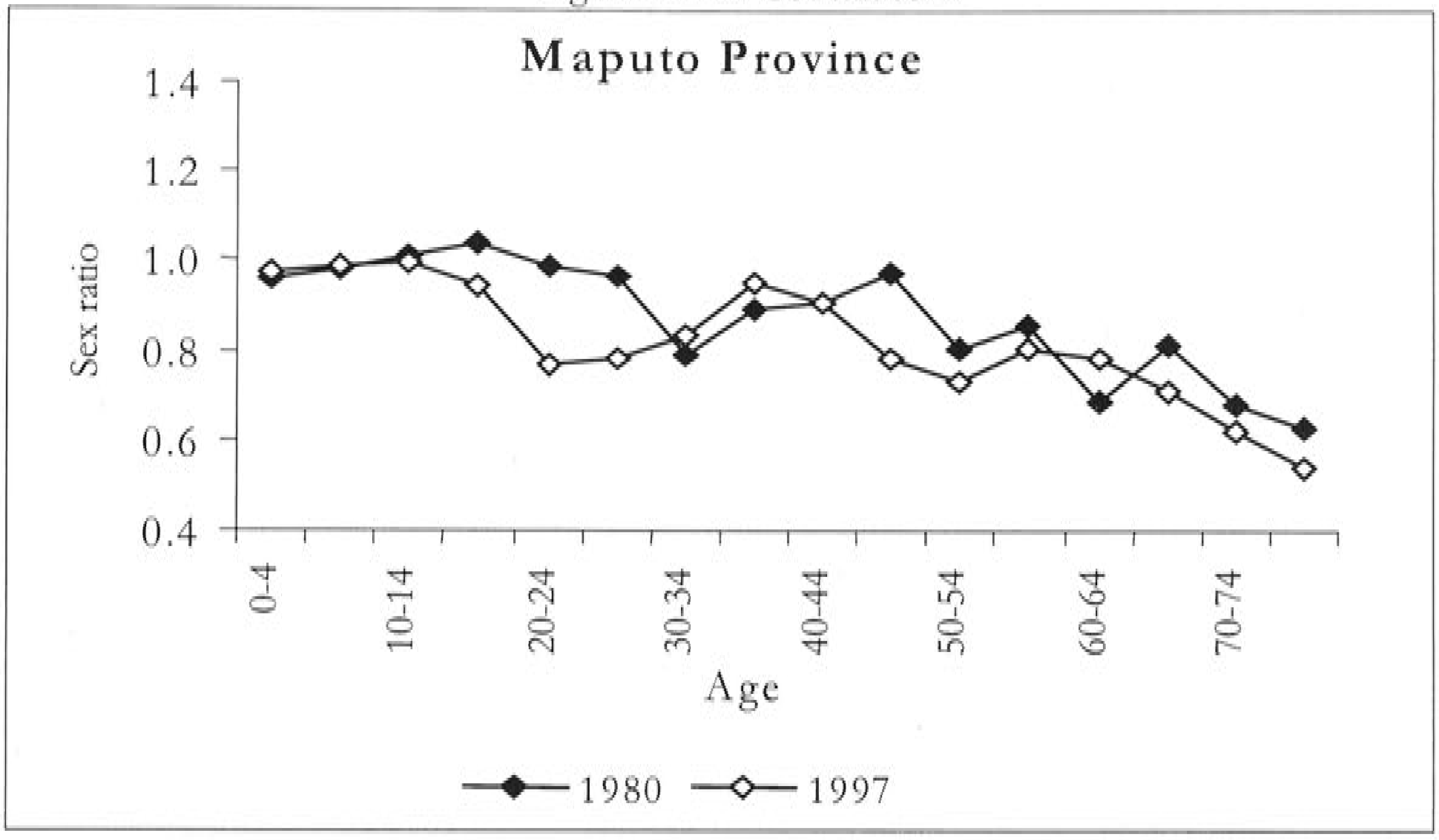


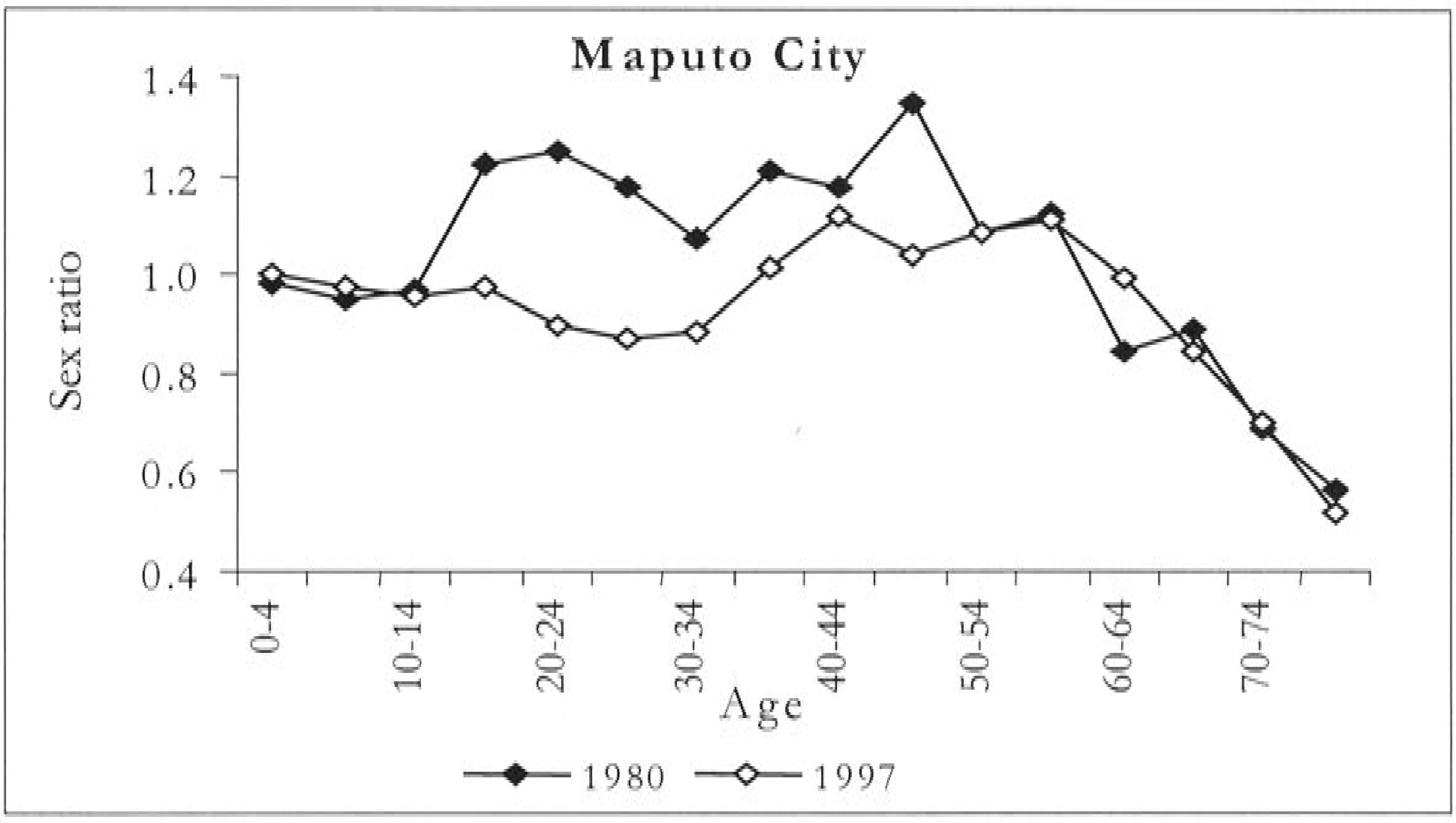




Source: Computed from 1980 and 1997 Censuses

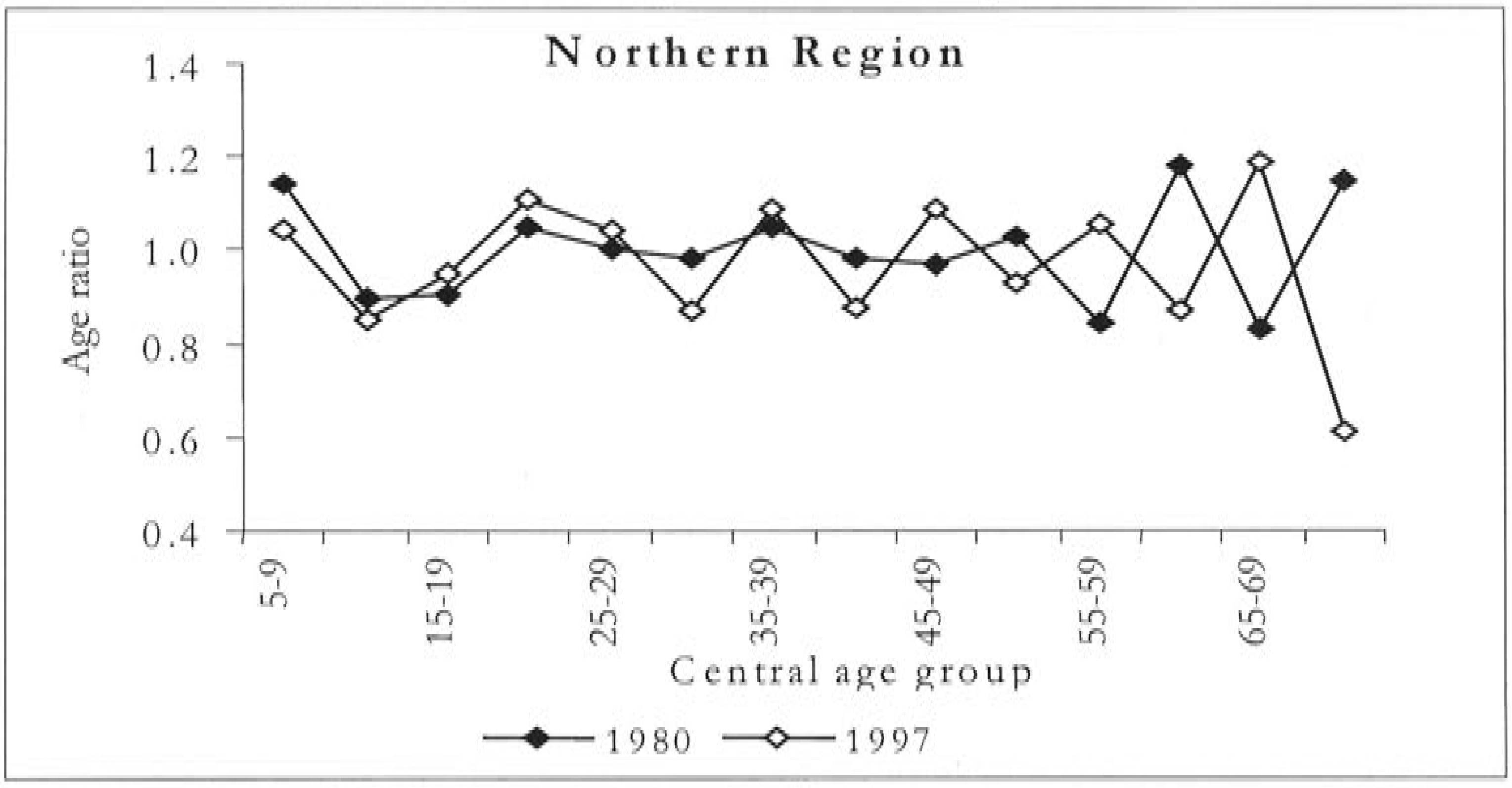
Figure B2.2.2 Continued…

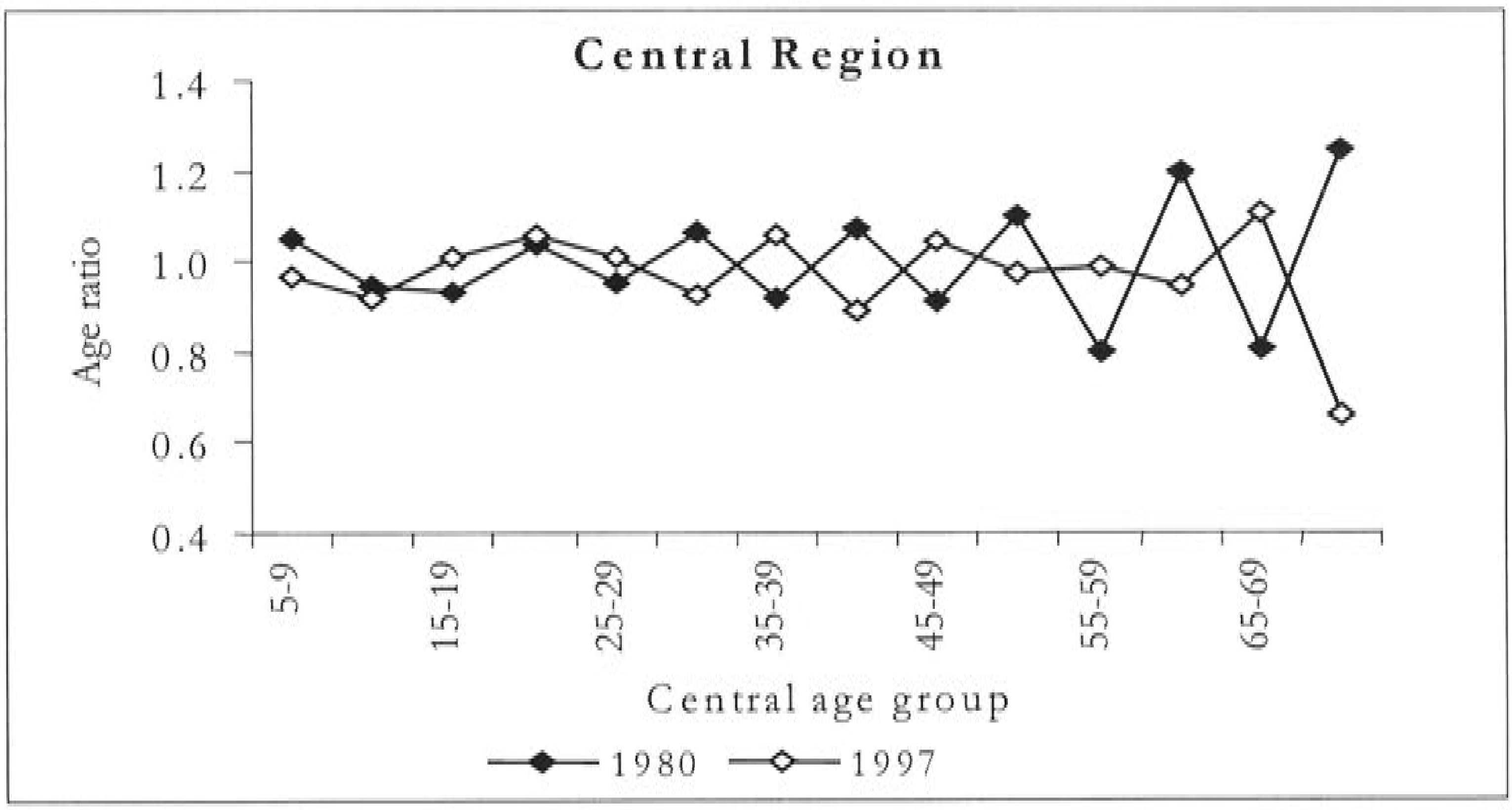


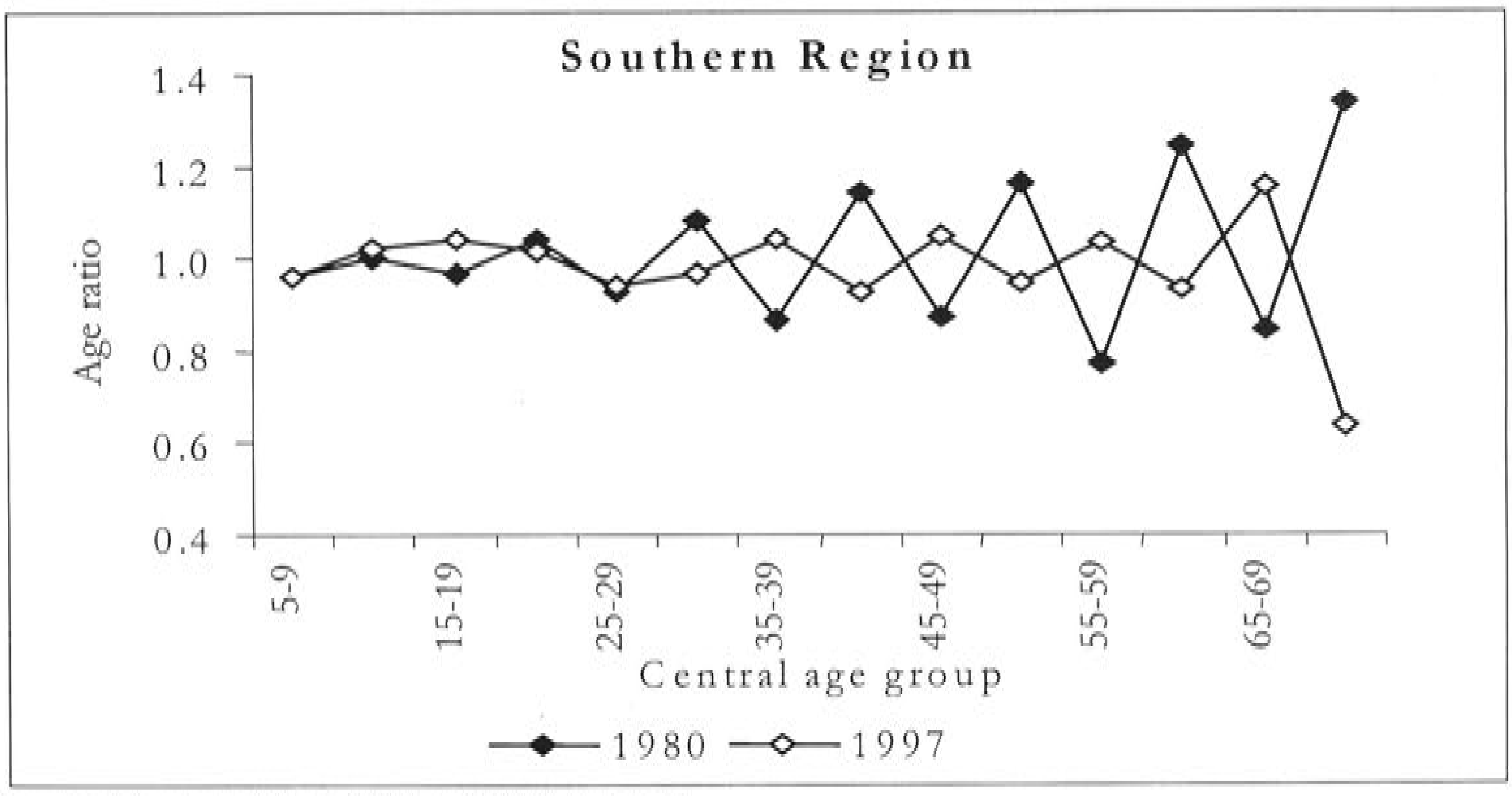


Source: Computed from 1980 and 1997 Censuses

Figure B2.2.3 Female age ratios, Mozambique 1980 and 1997







Source: Computed from 1980 and 1997 Censuses

B2.3 Guideline questions for focus group discussions and in-depth interviews

Focus group discussions and in-depth interviews are aimed at discussing cultural norms related to marriage, breastfeeding and postpartum abstinence, and attitudes towards polygyny, infertility and fertility regulation. It is of interest to find out whether different socio-cultural groups in Mozambique differ in relation to the main aspects of the reproductive process.

1. Marriage

- What is marriage in the context of your culture? What does the process of marriage involve? Is there any marriage ceremony?
- Who selects the partner for marriage?
- How important is marriage for a woman or man in your society? Why?
- What do you think is more important, marriage or childbearing? Why?
- What are the attitudes towards premarital sexual intercourse in your culture?
- Are there any traditional norms against pre- or non-marital childbearing in …?
- What are the factors that would contribute to marital dissolution in …?
- What is a good age at marriage for men and women? Why?
- Why do you think some men marry more than one wife?
- What are the advantages and disadvantages of polygyny?

2. Infertility

- Do you think every woman should have children? Why?
- What happens if a man is married to a woman who cannot have children?
- Why do you think some women cannot have children?
- If a couple cannot have a child what do they usually do or what should they do? Why?
- Who is to blame if a couple cannot have children? Why?
- Is there any ceremony in your culture/community that sterile women are not allowed to attend? If yes, what is the ceremony about? Why cannot sterile women attend?
- What happens if a sterile woman dies?
- Does it still happen now? Why?

3. Breastfeeding and abstinence practices

- For how long should a mother breastfeed her child? Why?
- Do you think a mother should abstain from sex while breastfeeding? Why?
- What happens if a woman become pregnant while breastfeeding?
- What do people say if the first child dies during the breastfeeding period?
- For how long should a mother abstain from sexual intercourse after the birth of a child? Why?
- What happens to a woman (or couple) who breaks the rules related to postpartum sexual abstinence? Are there any sanctions against women or couples who break the rules?
- Is it good to lengthen birth intervals? Why?
- What is the appropriate age for a woman to stop having children? How? Why?
- What is the appropriate age for a woman to stop having sexual intercourse? Why?

4. Family planning

- Do you think couples should decide beforehand how many children to have? Why?
- Is it good to limit the number of children? Why?
- Is it bad to limit the number of children? Why?
- If a couple wants no more children, what do they do to prevent (or delay) having a child?
- If a woman wants to limit her fertility what is the best way to do it? Why?
- Do you know anybody who is using contraception (traditional or modern) to limit or delay births?
- Have you ever talked or heard other people talking about family planning? Is this kind of conversation common among women in your community? Why? What do they say?
- Did you talk about family planning with your partner before getting married?

5. Abortion

- What is abortion?
- Have you ever heard of anybody who has used abortion to prevent births? Why do you think women have abortions? Do you think it is a good idea to have an abortion if you do not want to have a child? Why?
- How common is abortion in your community? Is it more common now or before? Why?
- Who do you go to to have an abortion? How do they do it?

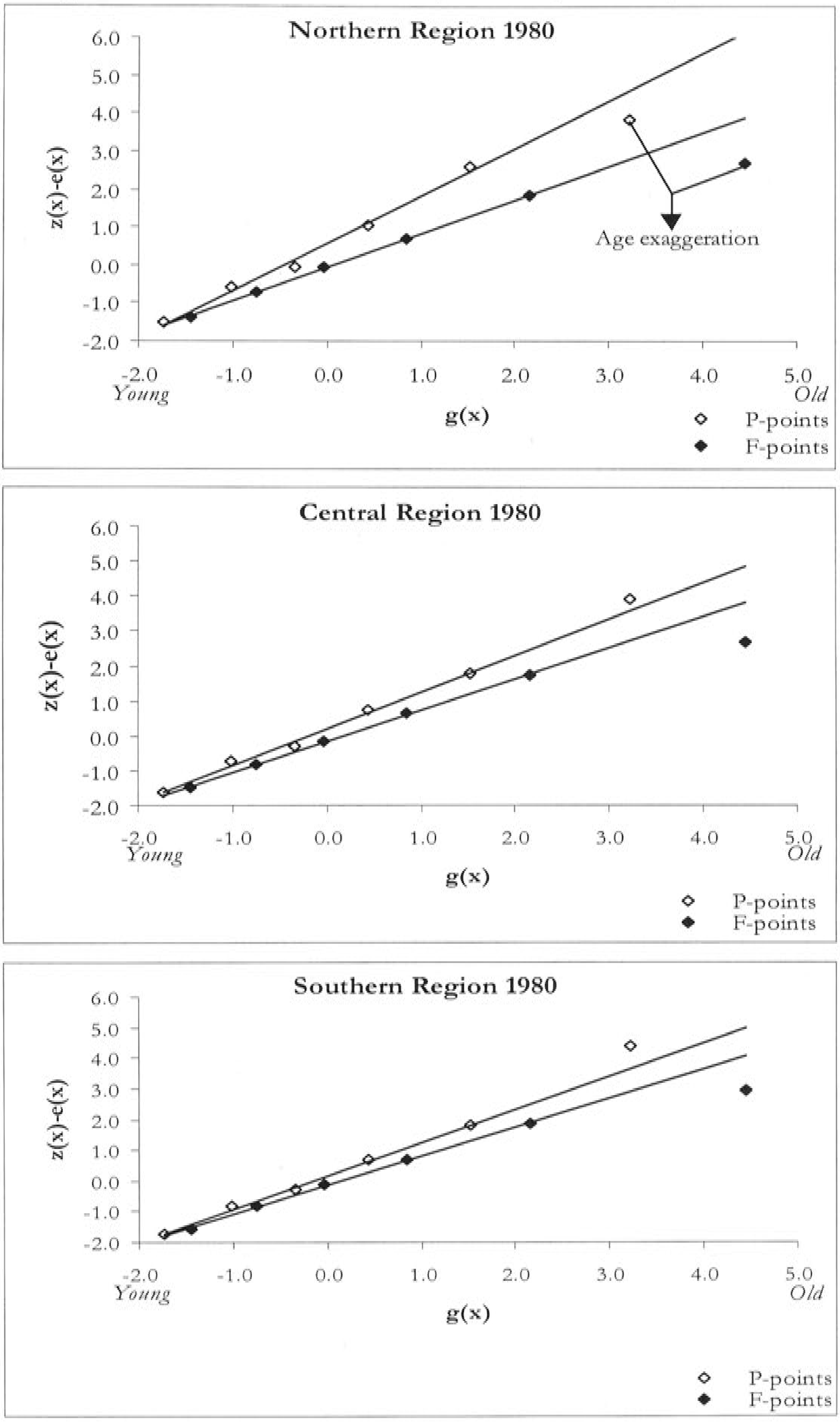
C3.1 Tables and graphs for Chapter 3

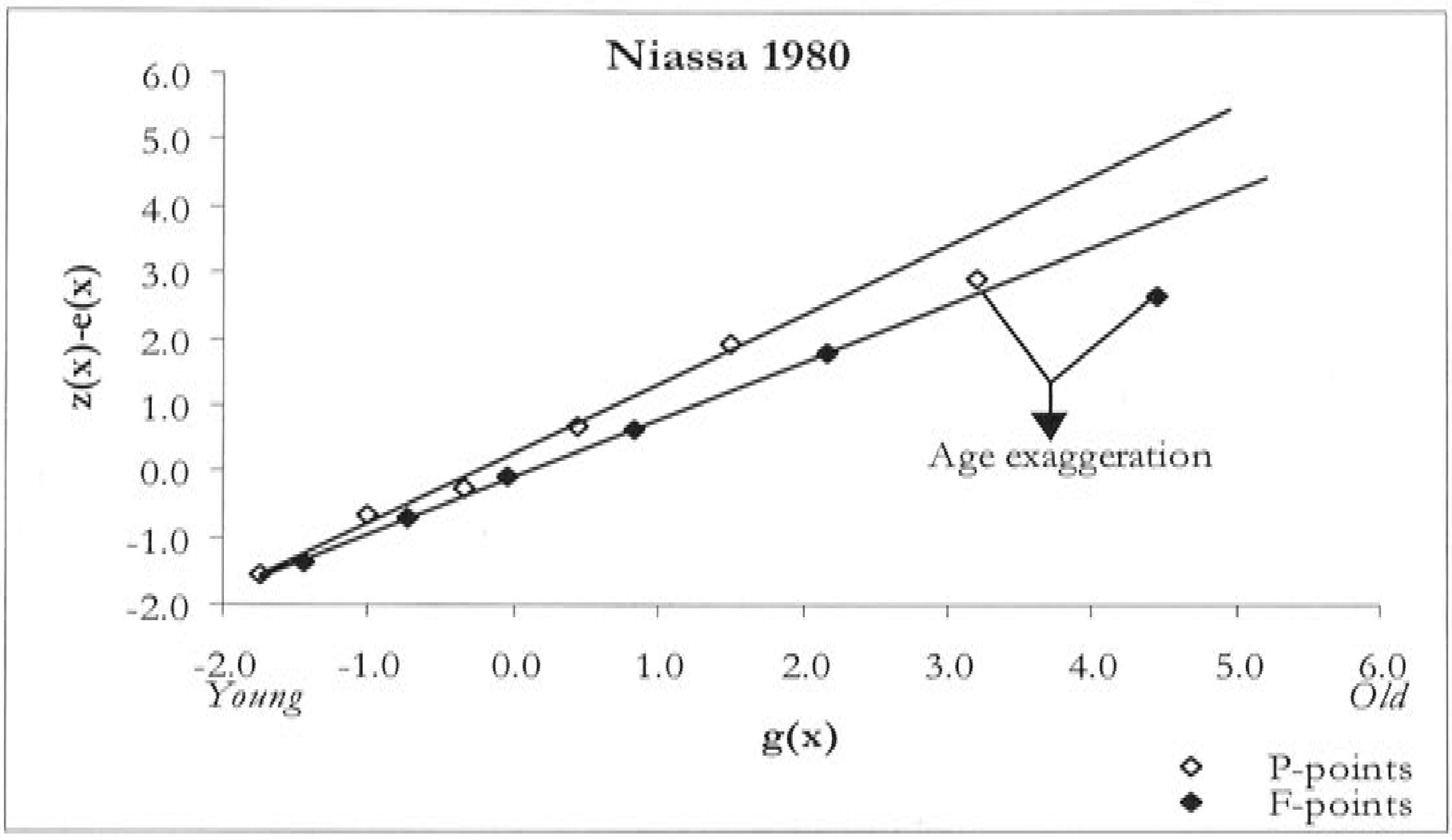
Table C3.1 P/F ratios by province, Mozambique 1980 and 1997

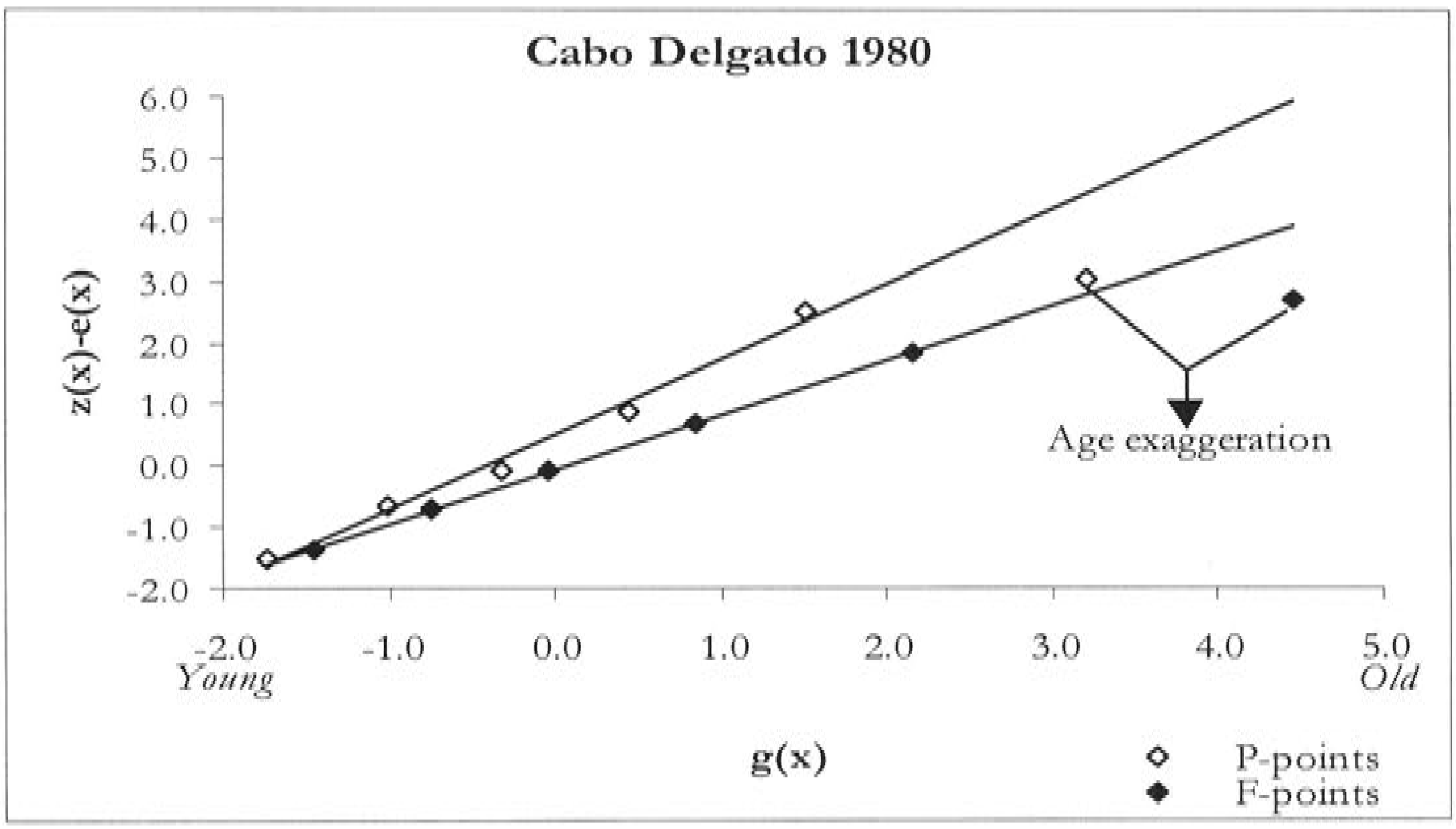
Region/Province	Age Groups 15-19	20-24	25-29	30-34	35-39	40-44	45-49
	1980 Census						
Northern	**2.05**	**1.62**	**1.33**	**1.23**	**1.10**	**1.02**	**0.91**
Niassa	1.88	1.55	1.32	1.28	1.19	1.14	1.06
Cabo Delgado	2.21	1.77	1.47	1.36	1.24	1.15	1.03
Nampula	2.03	1.57	1.28	1.16	1.03	0.94	0.83
Central	**2.04**	**1.69**	**1.38**	**1.33**	**1.21**	**1.16**	**1.06**
Zambézia	2.04	1.71	1.38	1.31	1.19	1.13	1.02
Tete	1.87	1.63	1.36	1.33	1.21	1.13	1.04
Manica	1.94	1.55	1.29	1.26	1.14	1.11	1.01
Sofala	2.25	1.77	1.46	1.42	1.32	1.28	1.18
Southern	**1.83**	**1.55**	**1.28**	**1.22**	**1.14**	**1.10**	**1.02**
Inhambane	2.04	1.73	1.37	1.29	1.21	1.17	1.10
Gaza	2.20	1.78	1.41	1.32	1.21	1.16	1.05
Maputo Province	2.05	1.81	1.51	1.42	1.32	1.24	1.12
Maputo City	1.37	1.15	1.02	0.98	0.95	0.93	0.87
Mozambique	**2.00**	**1.64**	**1.34**	**1.27**	**1.15**	**1.10**	**0.99**
	1997 Census						
Northern	**1.65**	**1.31**	**1.18**	**1.14**	**1.09**	**1.08**	**1.02**
Niassa	1.71	1.32	1.21	1.19	1.15	1.14	1.09
Cabo Delgado	1.73	1.43	1.30	1.26	1.23	1.23	1.18
Nampula	1.60	1.27	1.13	1.08	1.02	1.01	0.95
Central	**1.68**	**1.40**	**1.29**	**1.28**	**1.21**	**1.23**	**1.16**
Zambézia	1.71	1.43	1.29	1.28	1.23	1.25	1.19
Tete	1.69	1.44	1.34	1.31	1.23	1.21	1.15
Manica	1.57	1.31	1.23	1.24	1.16	1.19	1.12
Sofala	1.71	1.37	1.28	1.27	1.21	1.22	1.16
Southern	**1.38**	**1.28**	**1.27**	**1.35**	**1.38**	**1.41**	**1.37**
Inhambane	1.31	1.18	1.13	1.18	1.18	1.19	1.13
Gaza	1.43	1.24	1.23	1.27	1.28	1.31	1.27
Maputo Province	1.43	1.38	1.39	1.51	1.55	1.60	1.56
Maputo City	1.41	1.39	1.44	1.56	1.65	1.75	1.78
Mozambique	**1.61**	**1.36**	**1.26**	**1.24**	**1.20**	**1.21**	**1.16**

Source: Computed from 1980 and 1997 Censuses.

Figure C3.1a Fit of the Relational Gompertz Model, Mozambique1980 Census




Niassa 1980
z(x)-e(x)
6.0
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
-2.0
-1.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
Young
Old
g(x)
Age exaggeration
P-points
F-points


Cabo Delgado 1980
z(x)-e(x)
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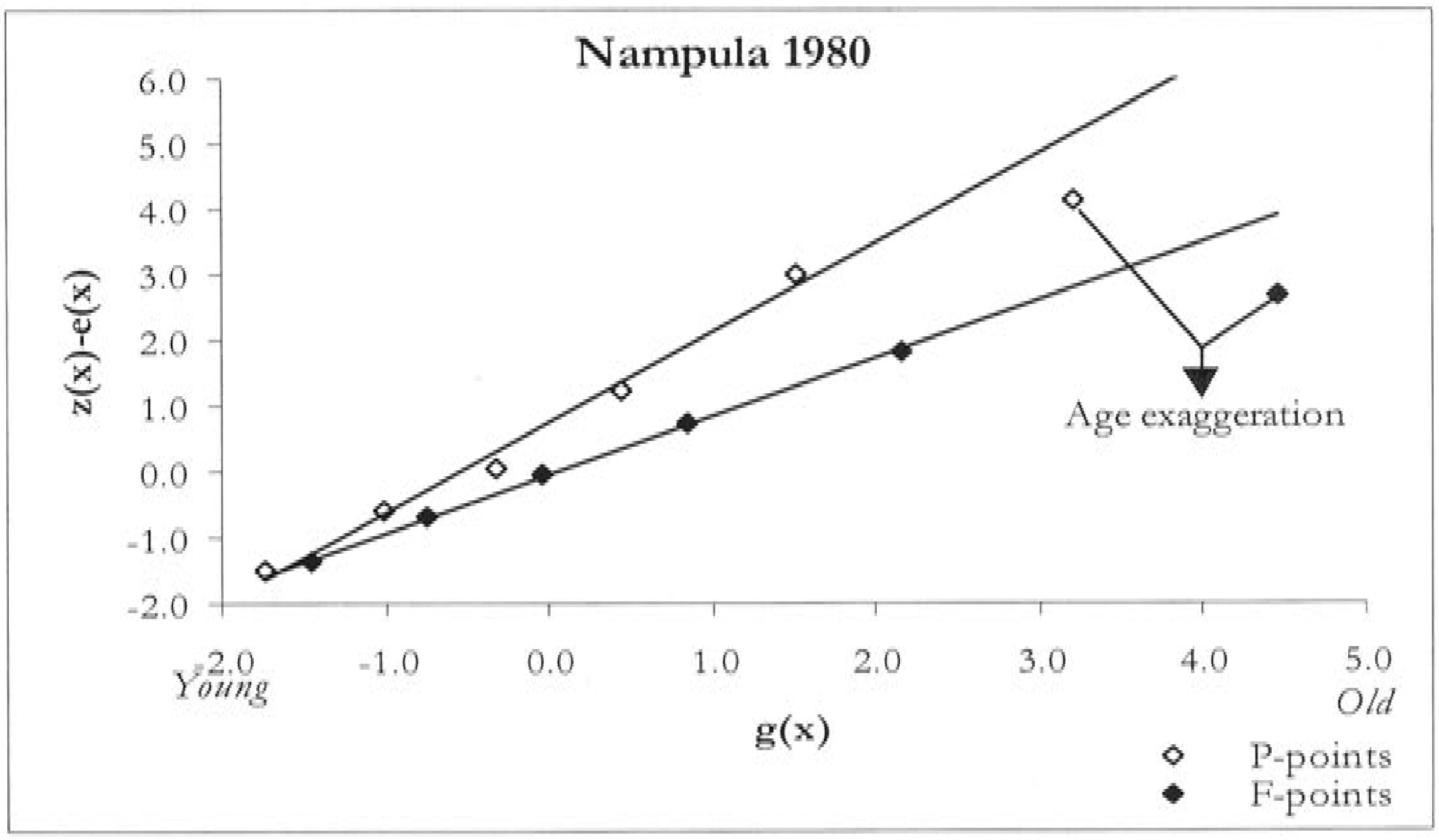
3.0
2.0
1.0
0.0
-1.0
-2.0
-2.0
-1.0
0.0
1.0
2.0
3.0
4.0
5.0
Young
Old
g(x)
Age exaggeration
P-points
F-points


Nampula 1980
z(x)-e(x)
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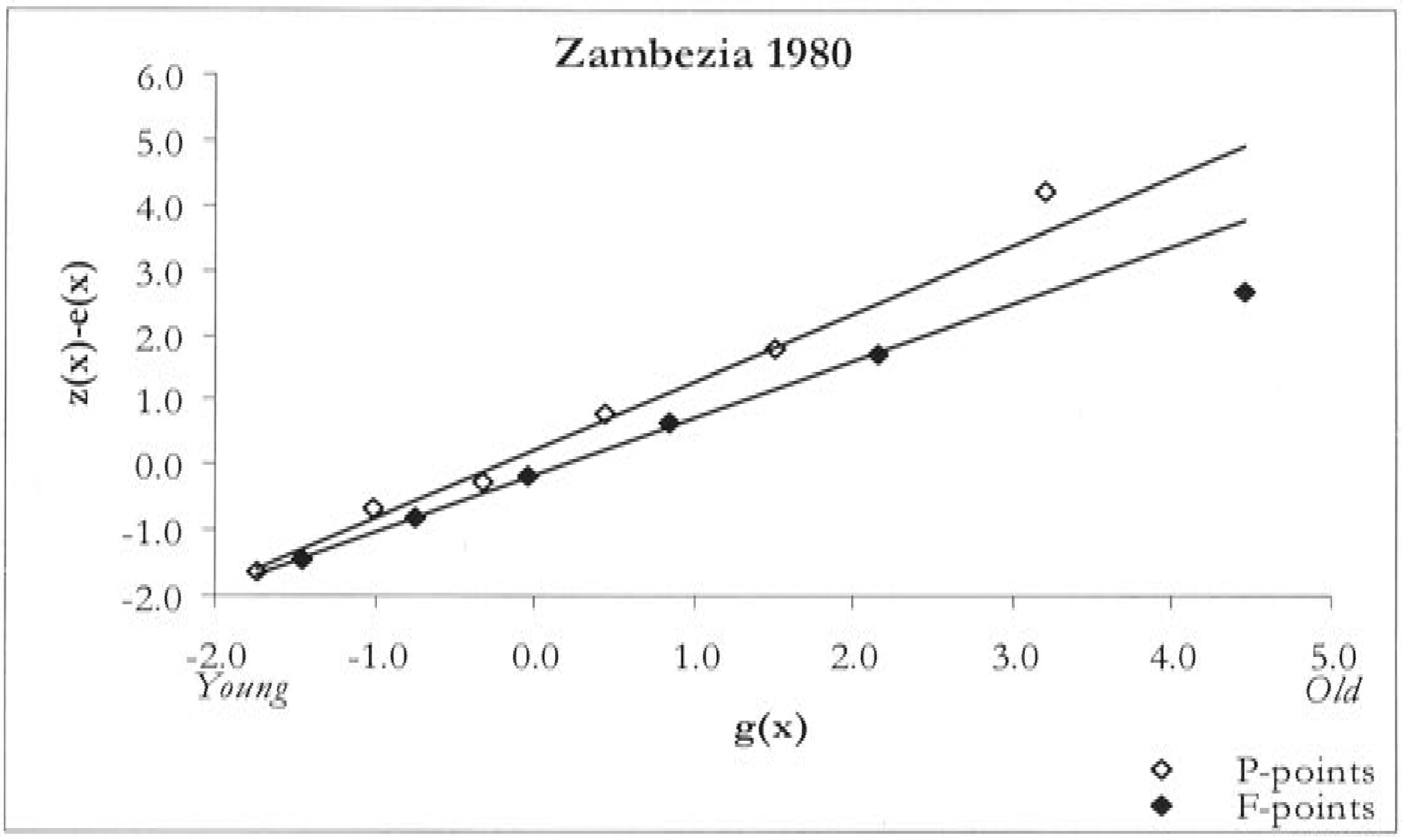
3.0
2.0
1.0
0.0
-1.0
-2.0
-2.0
-1.0
0.0
1.0
2.0
3.0
4.0
5.0
Young
Old
g(x)
Age exaggeration
P-points
F-points


Zambezia 1980
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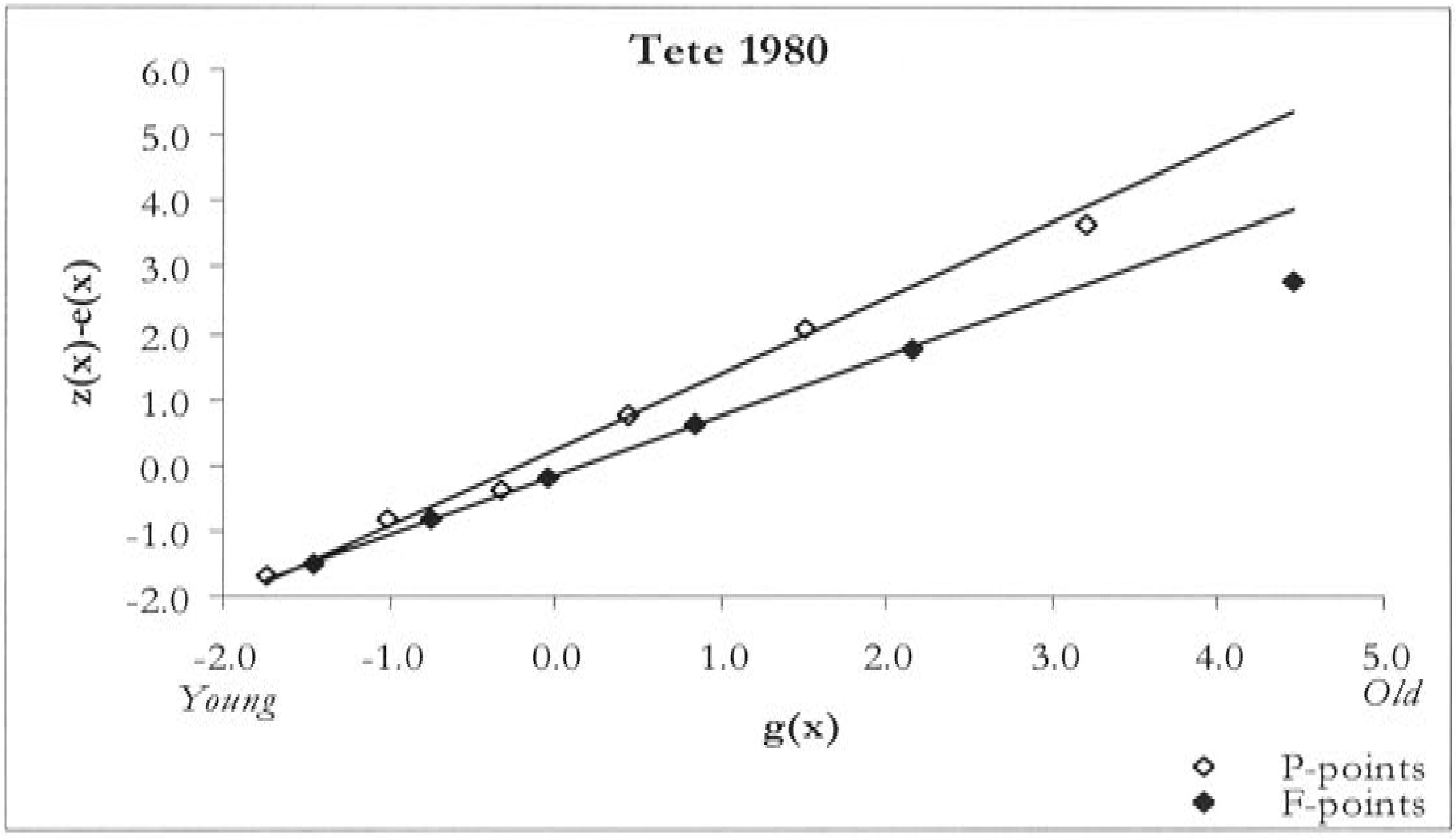
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
z(x)-e(x)
-2.0
Young
-1.0
0.0
1.0
2.0
3.0
4.0
5.0
Old
g(x)
P-points
F-points


Tete 1980
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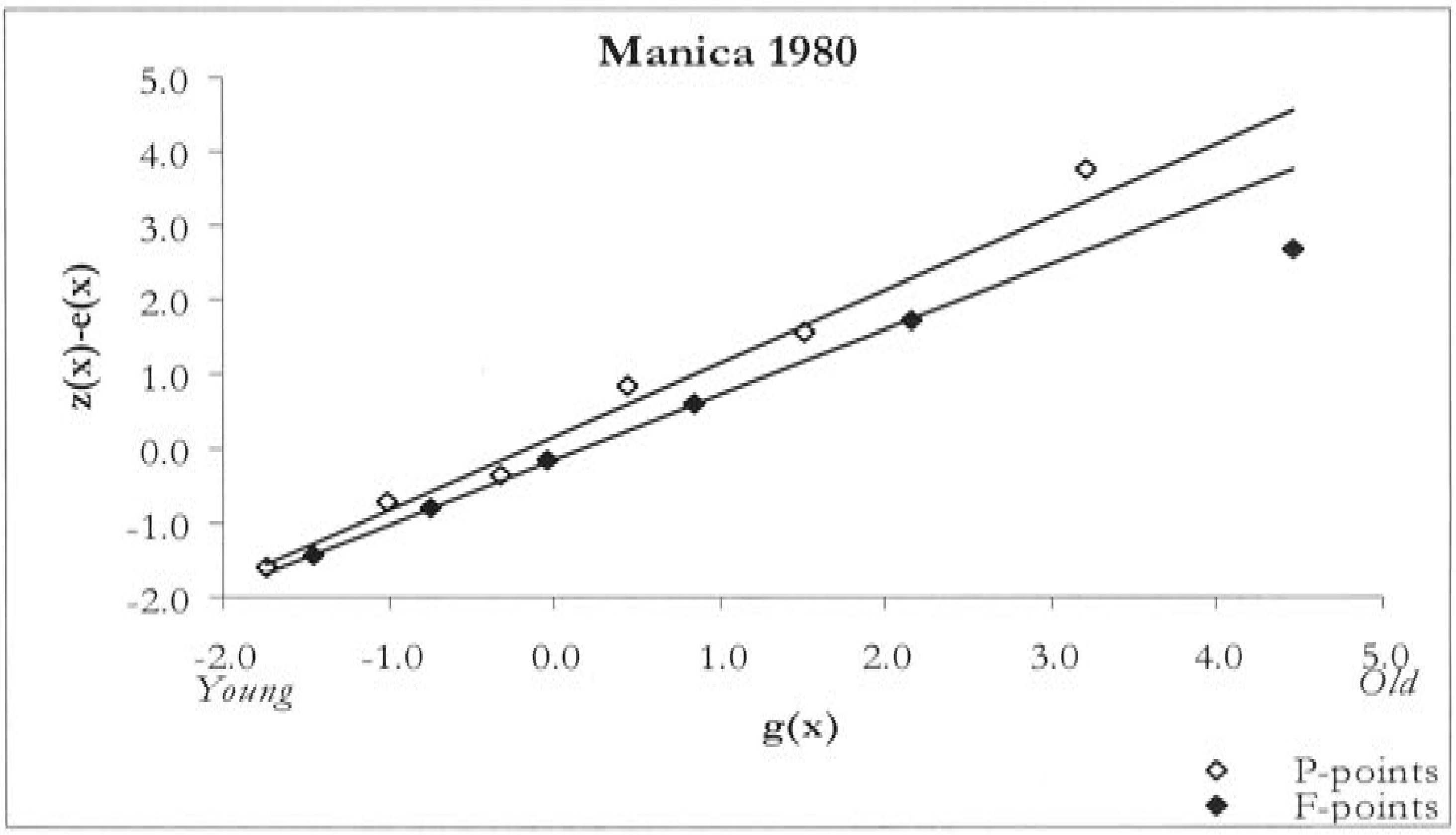
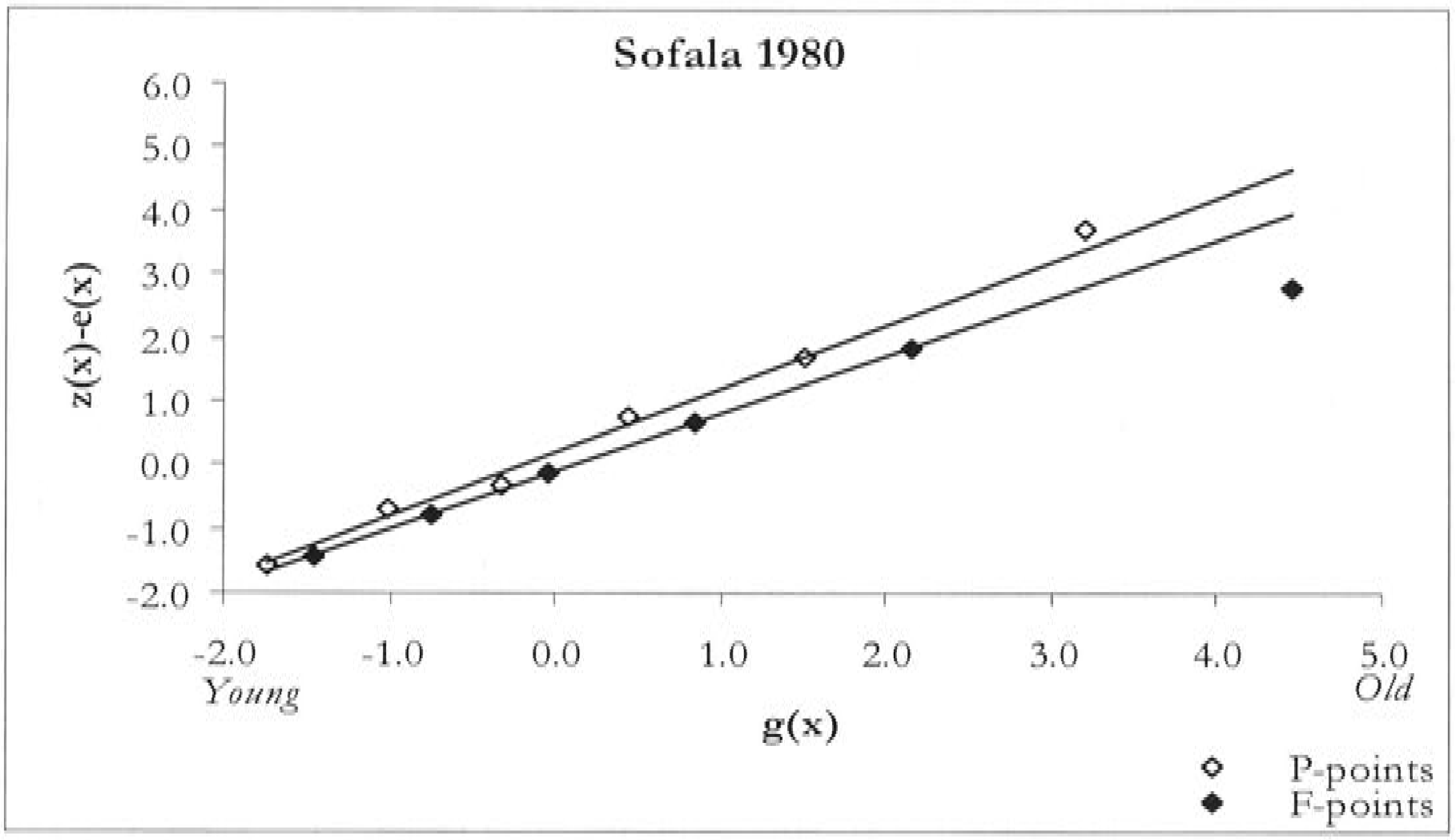
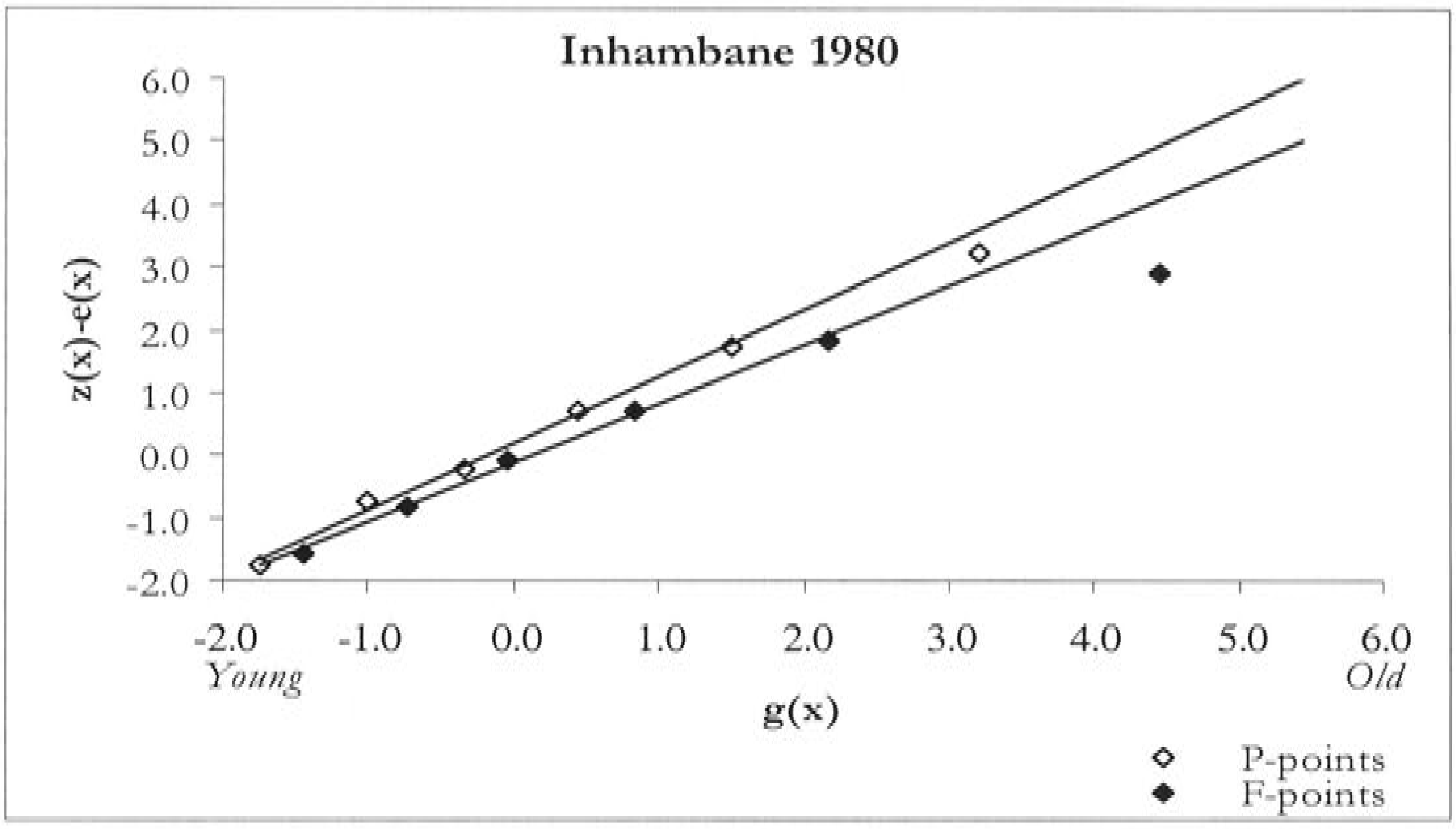
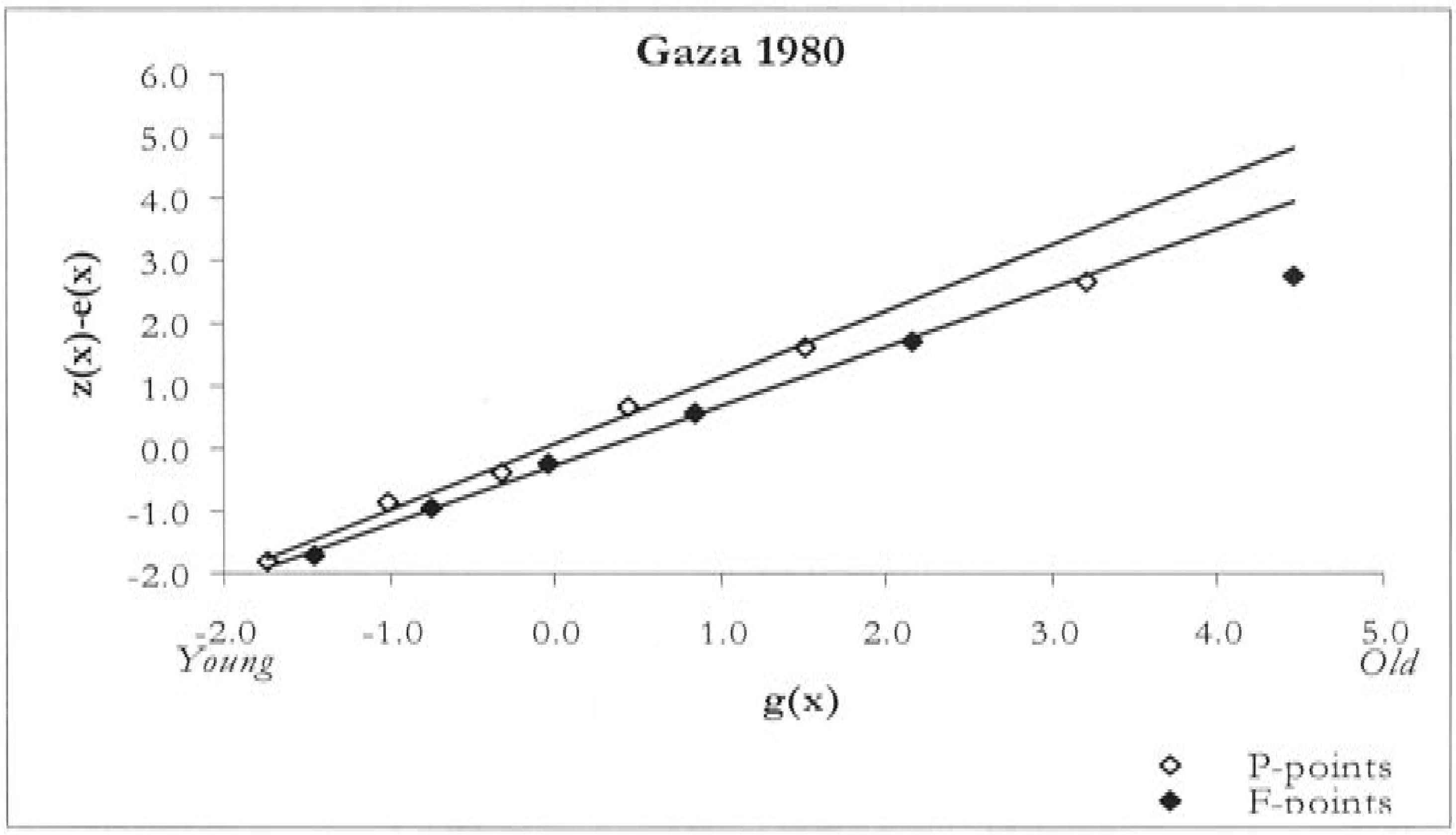
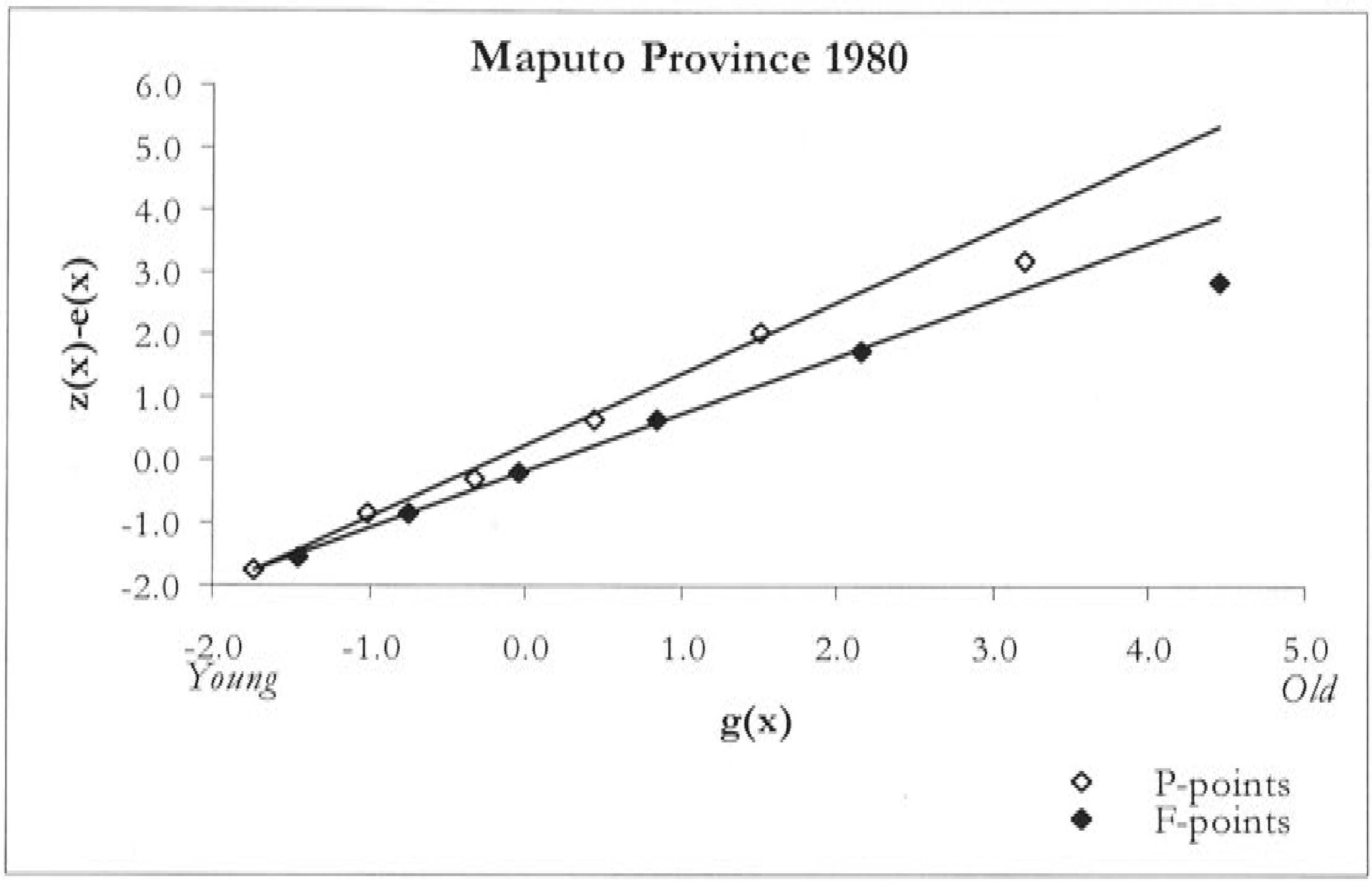
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
z(x)-e(x)
-2.0
Young
-1.0
0.0
1.0
2.0
3.0
4.0
5.0
Old
g(x)
P-points
F-points


Manica 1980
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
z(x)-e(x)
-2.0
Young
-1.0
0.0
1.0
2.0
3.0
4.0
5.0
Old
g(x)
P-points
F-points


Sofala 1980
6.0
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
z(x)-e(x)
-2.0
Young
-1.0
0.0
1.0
2.0
3.0
4.0
5.0
Old
g(x)
P-points
F-points


Inhambane 1980
6.0
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
z(x)-e(x)
-2.0
Young
-1.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
Old
g(x)
P-points
F-points


Gaza 1980
6.0
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
z(x)-e(x)
-2.0
Young
-1.0
0.0
1.0
2.0
3.0
4.0
5.0
Old
g(x)
P-points
F-points


Maputo Province 1980
z(x)-e(x)
6.0
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
-2.0
Young
-1.0
0.0
1.0
2.0
3.0
4.0
5.0
Old
g(x)
P-points
F-points

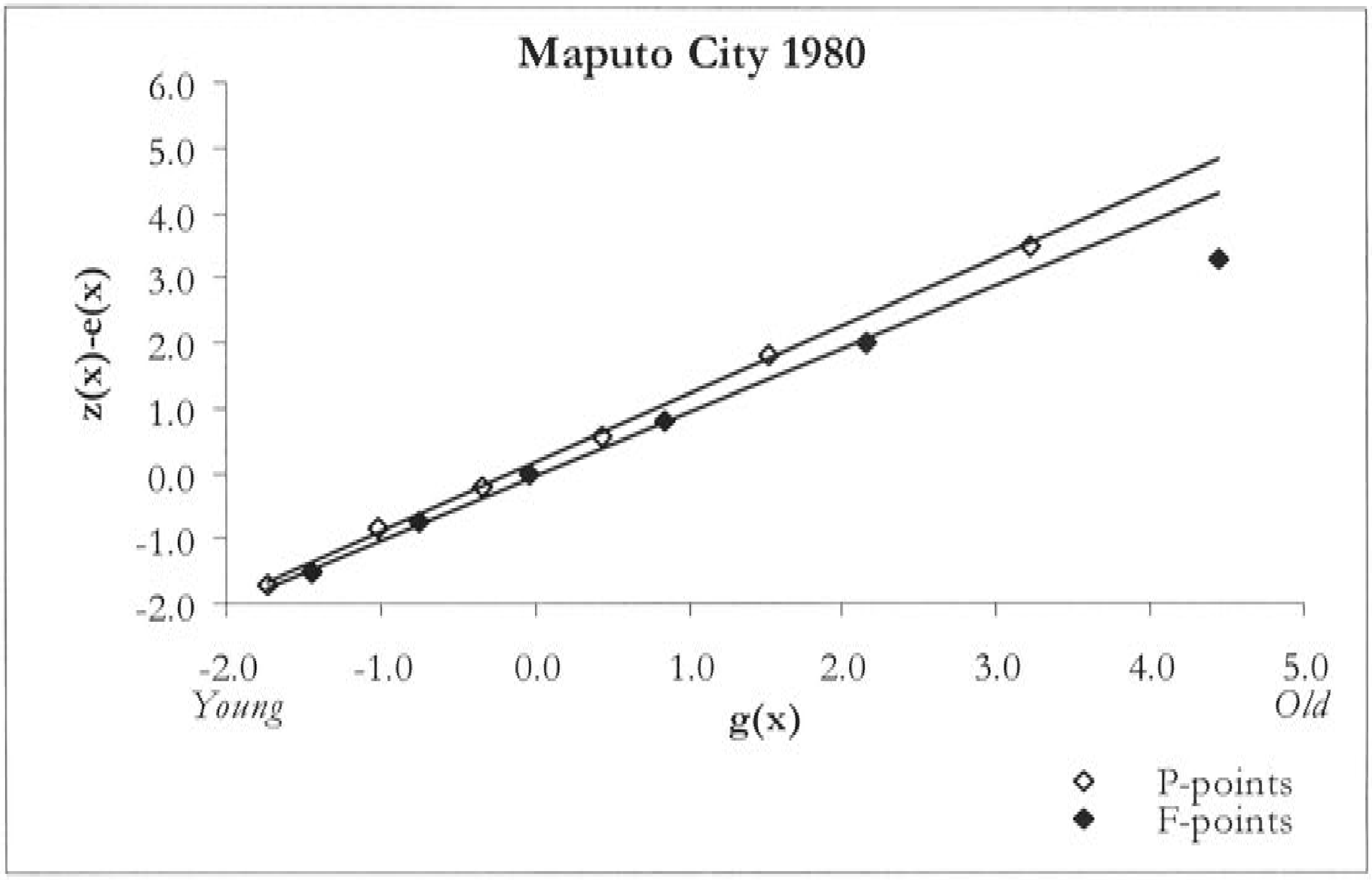
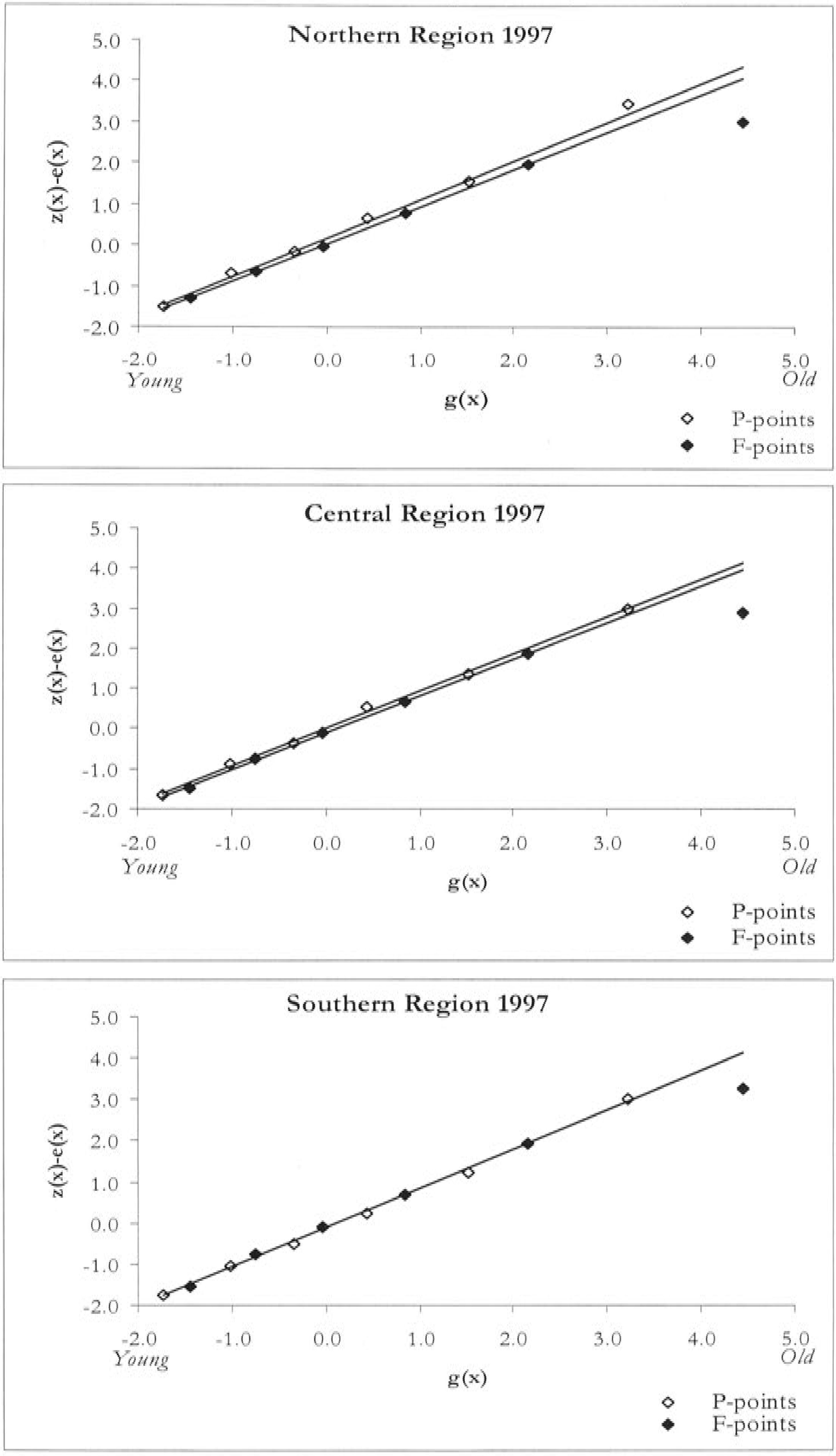
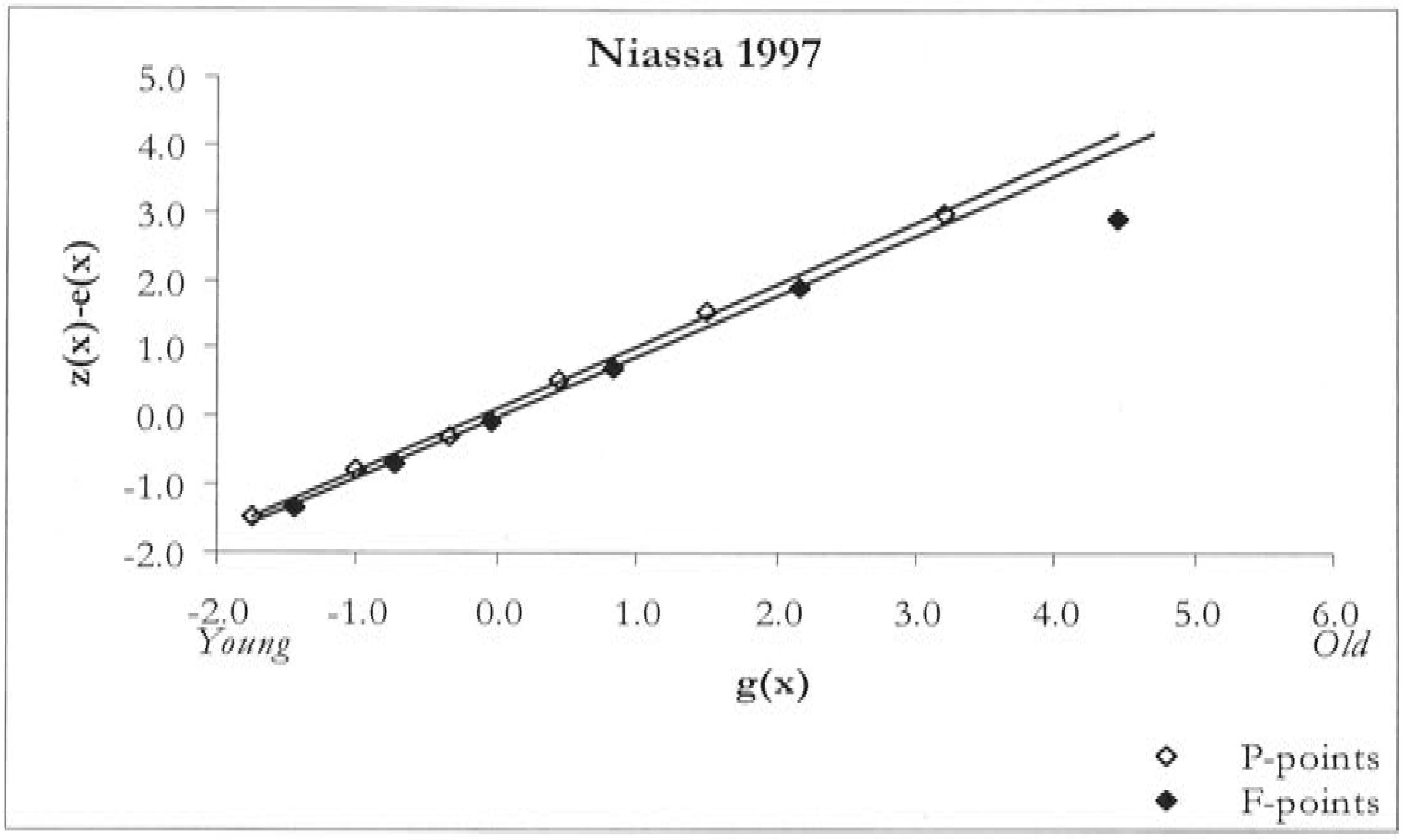
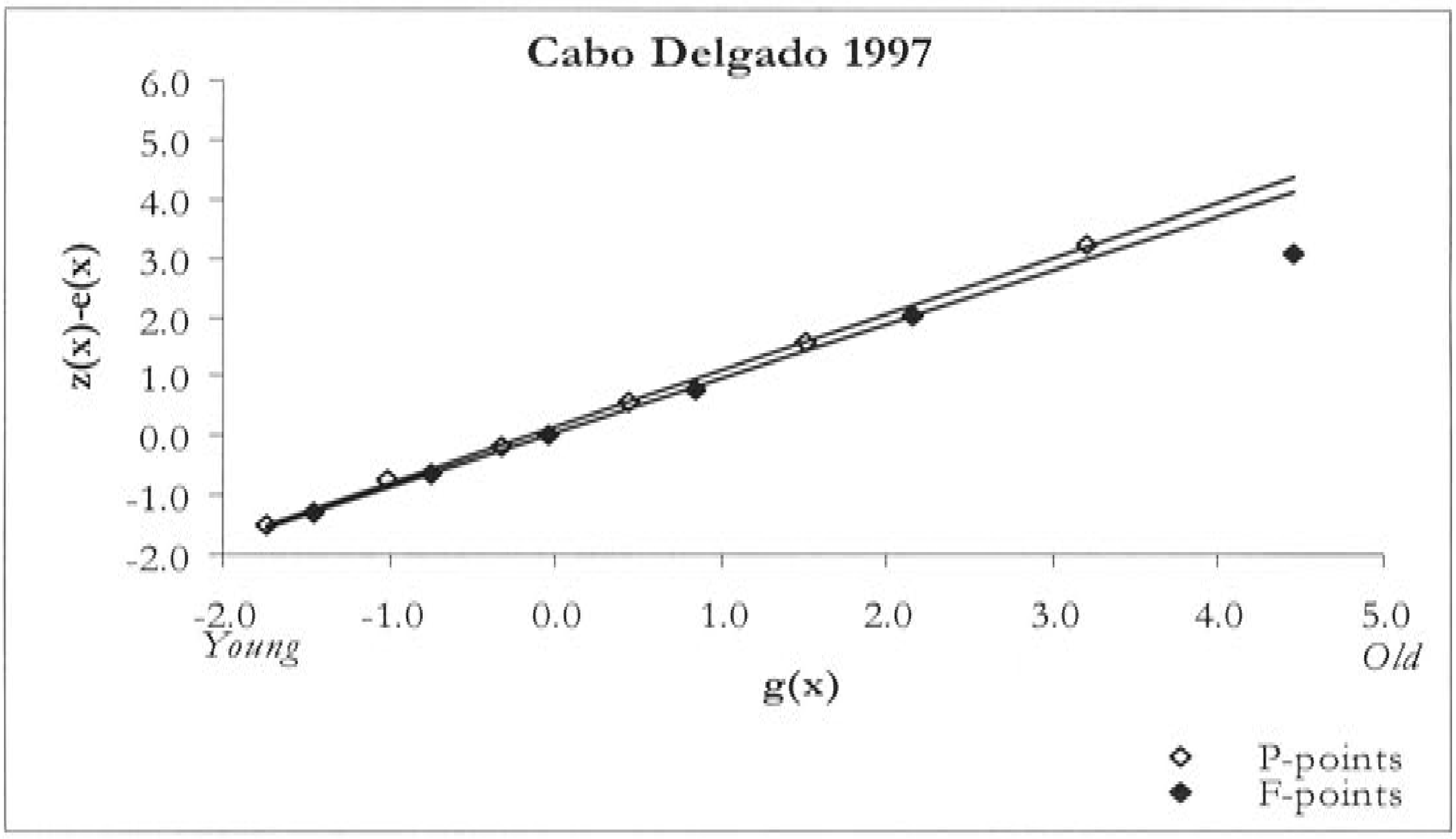
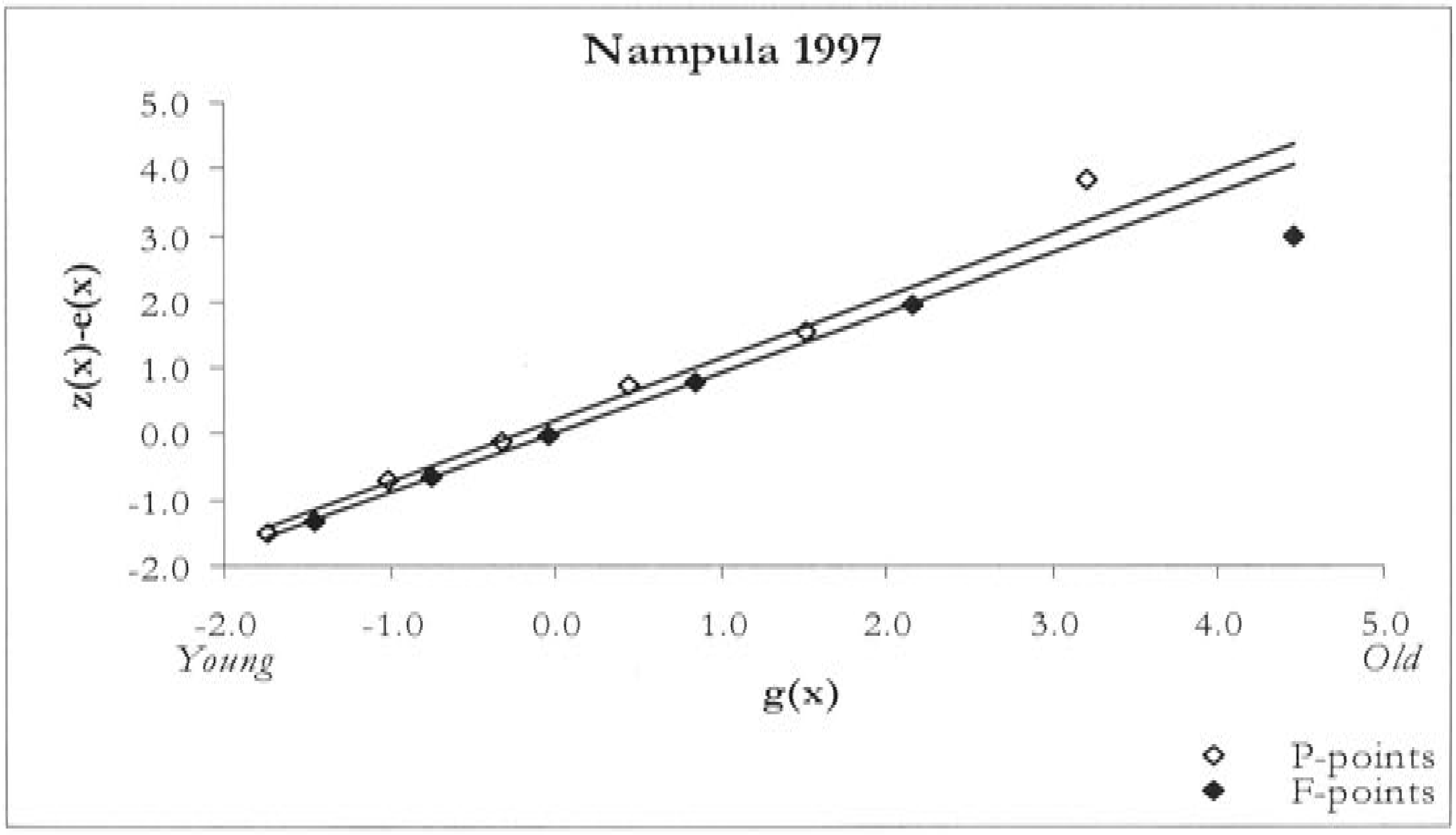

Maputo City 1980
z(x)-e(x)
6.0
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
-2.0
Young
-1.0
0.0
1.0
2.0
3.0
4.0
5.0
Old
g(x)
P-points
F-points

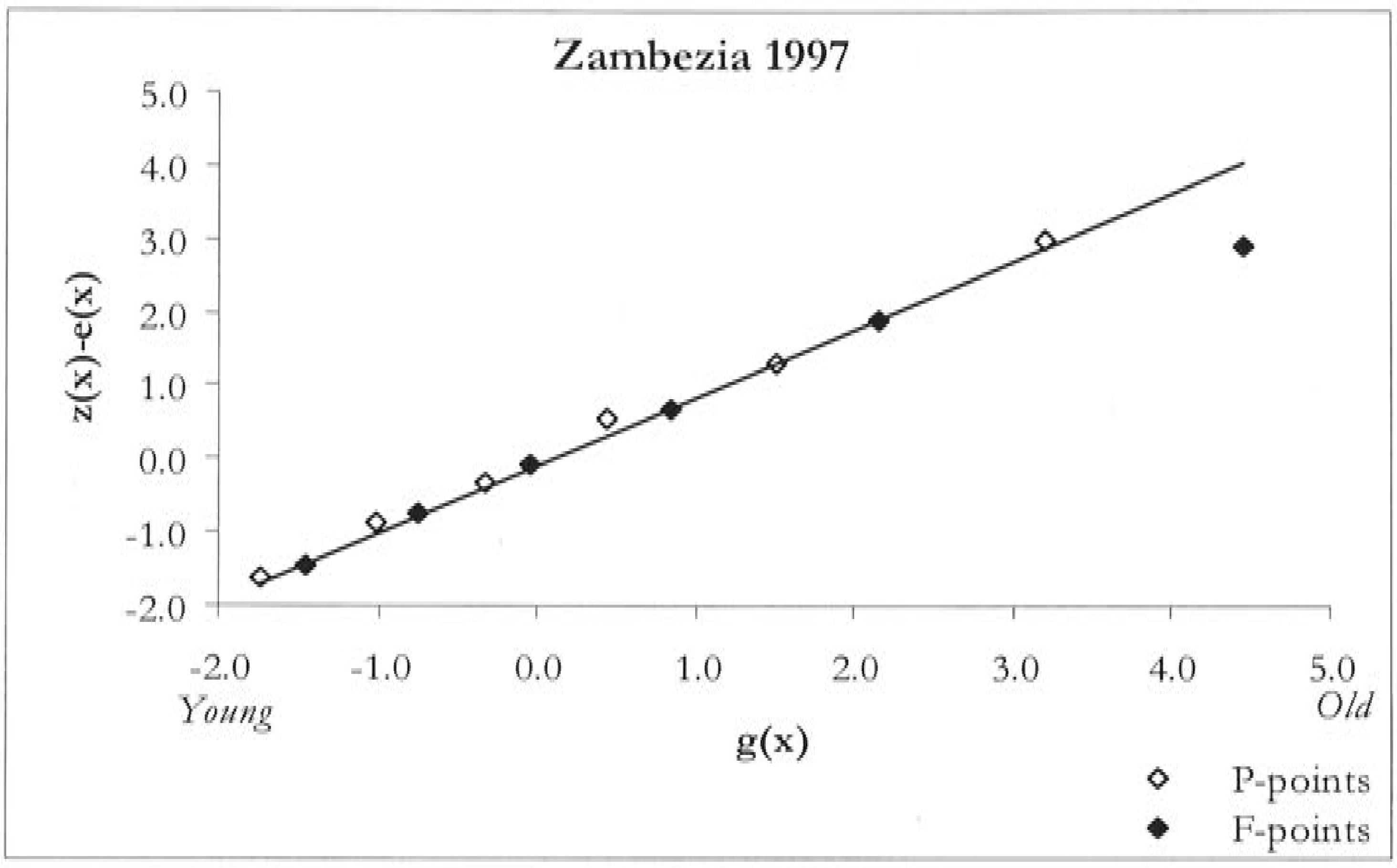
Figure C3.1b Fit of the Relational Gompertz Model, Mozambique 1997 Census




Niassa 1997
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
z(x)-e(x)
-2.0
-1.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
Young
Old
g(x)
P-points
F-points


Cabo Delgado 1997
6.0
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
z(x)-e(x)
-2.0
-1.0
0.0
1.0
2.0
3.0
4.0
5.0
Young
Old
g(x)
P-points
F-points


Nampula 1997
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
z(x)-e(x)
-2.0
-1.0
0.0
1.0
2.0
3.0
4.0
5.0
Young
Old
g(x)
P-points
F-points


Zambezia 1997
z(x)-e(x)
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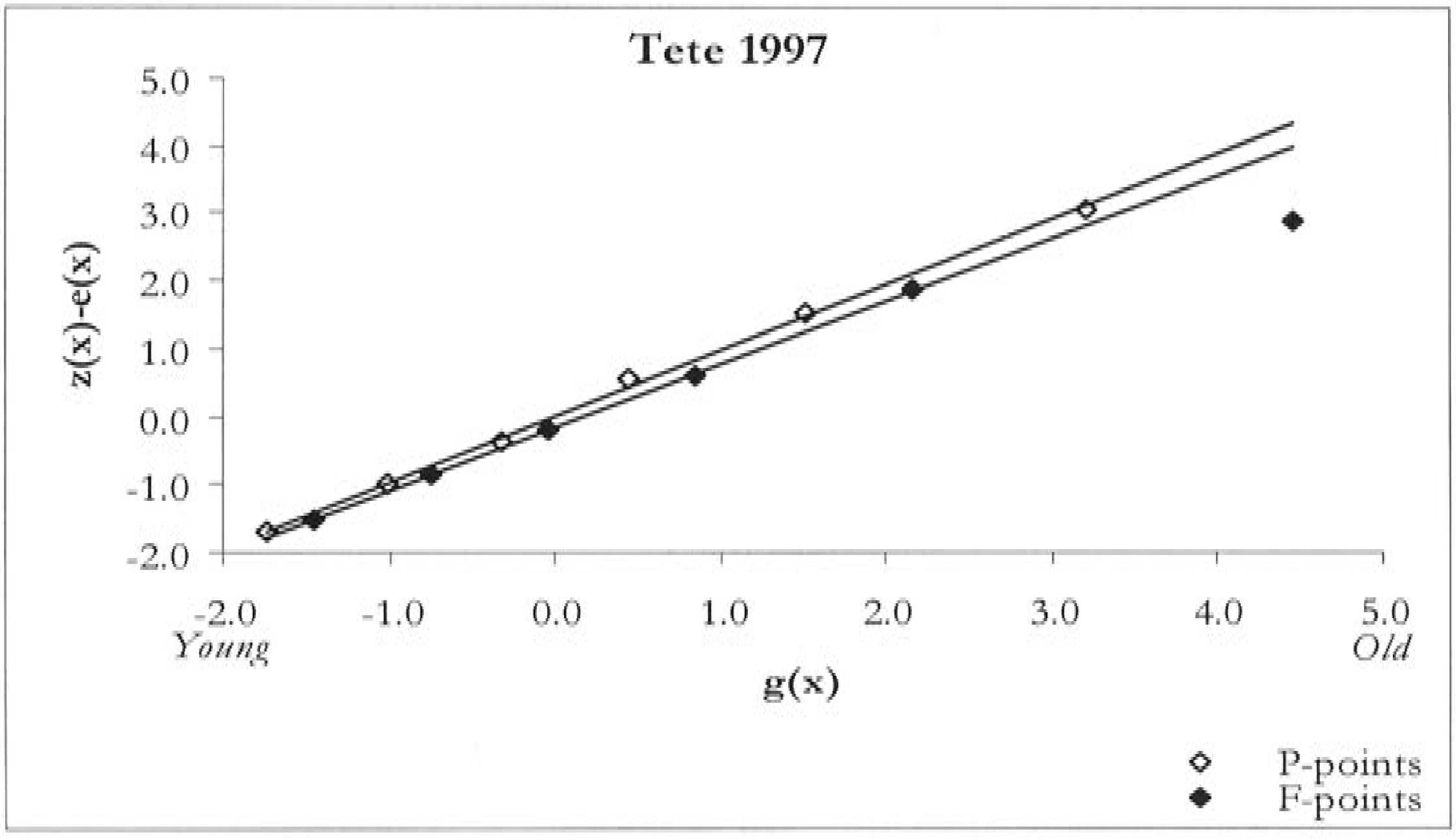
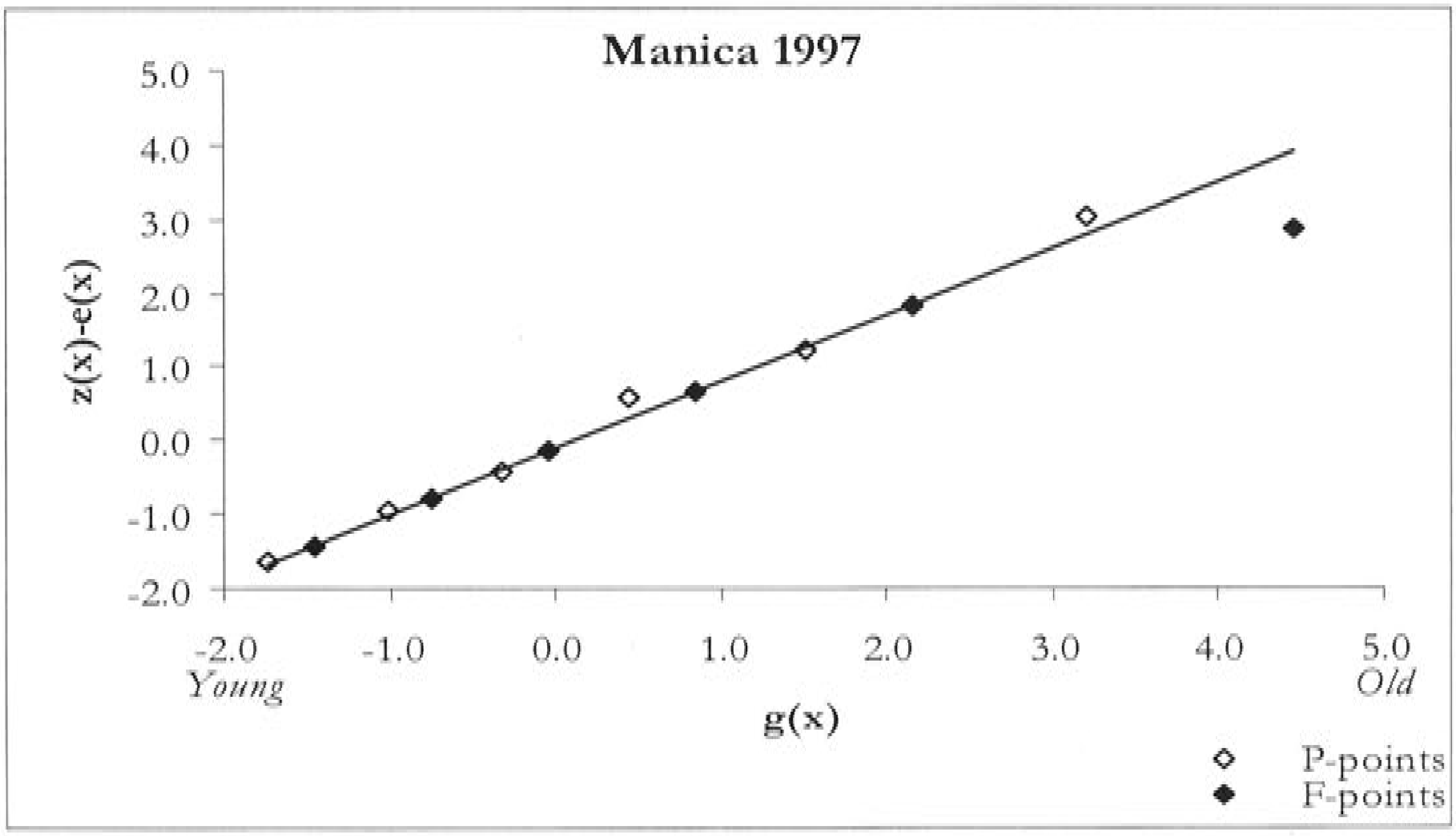
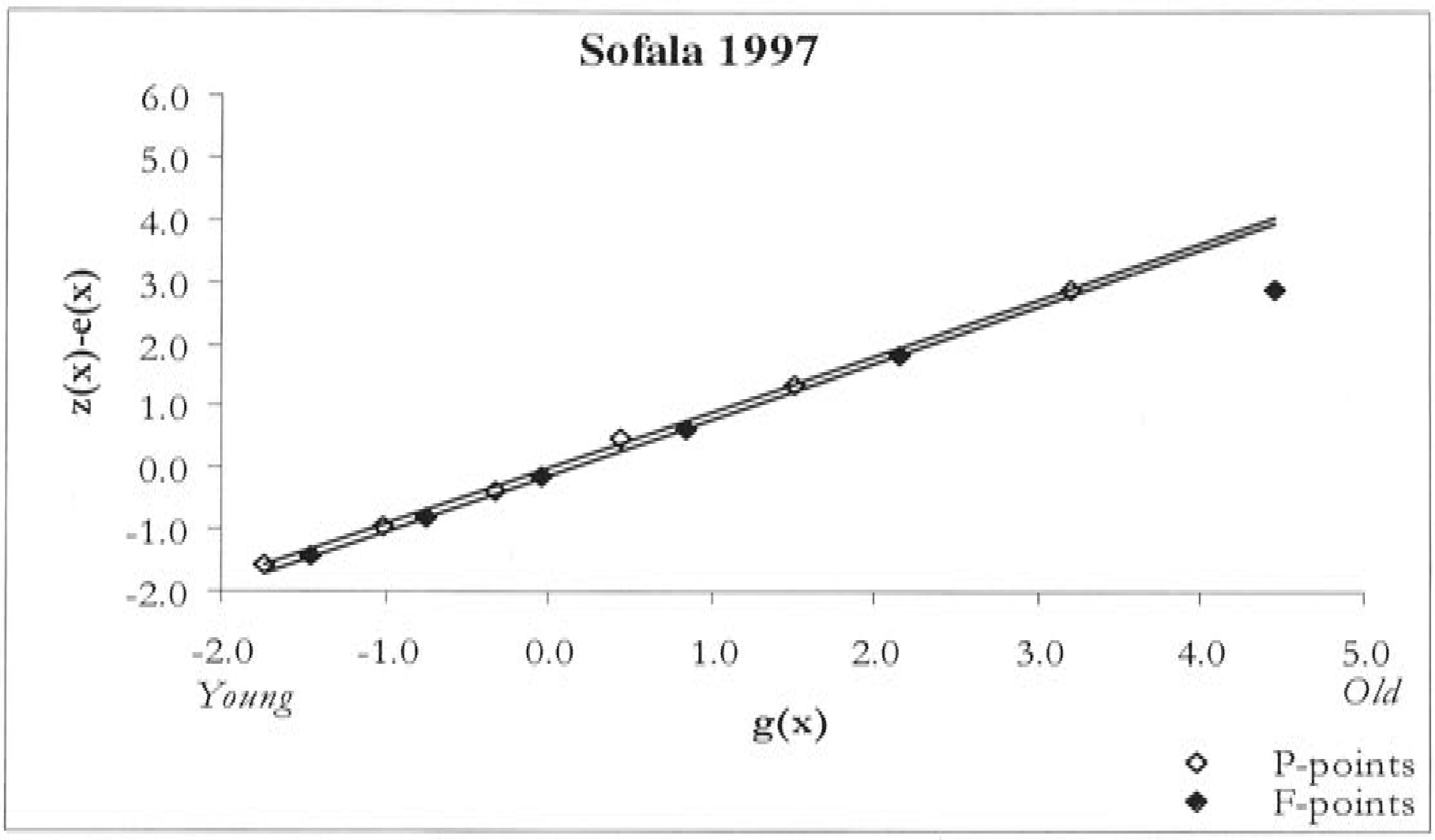
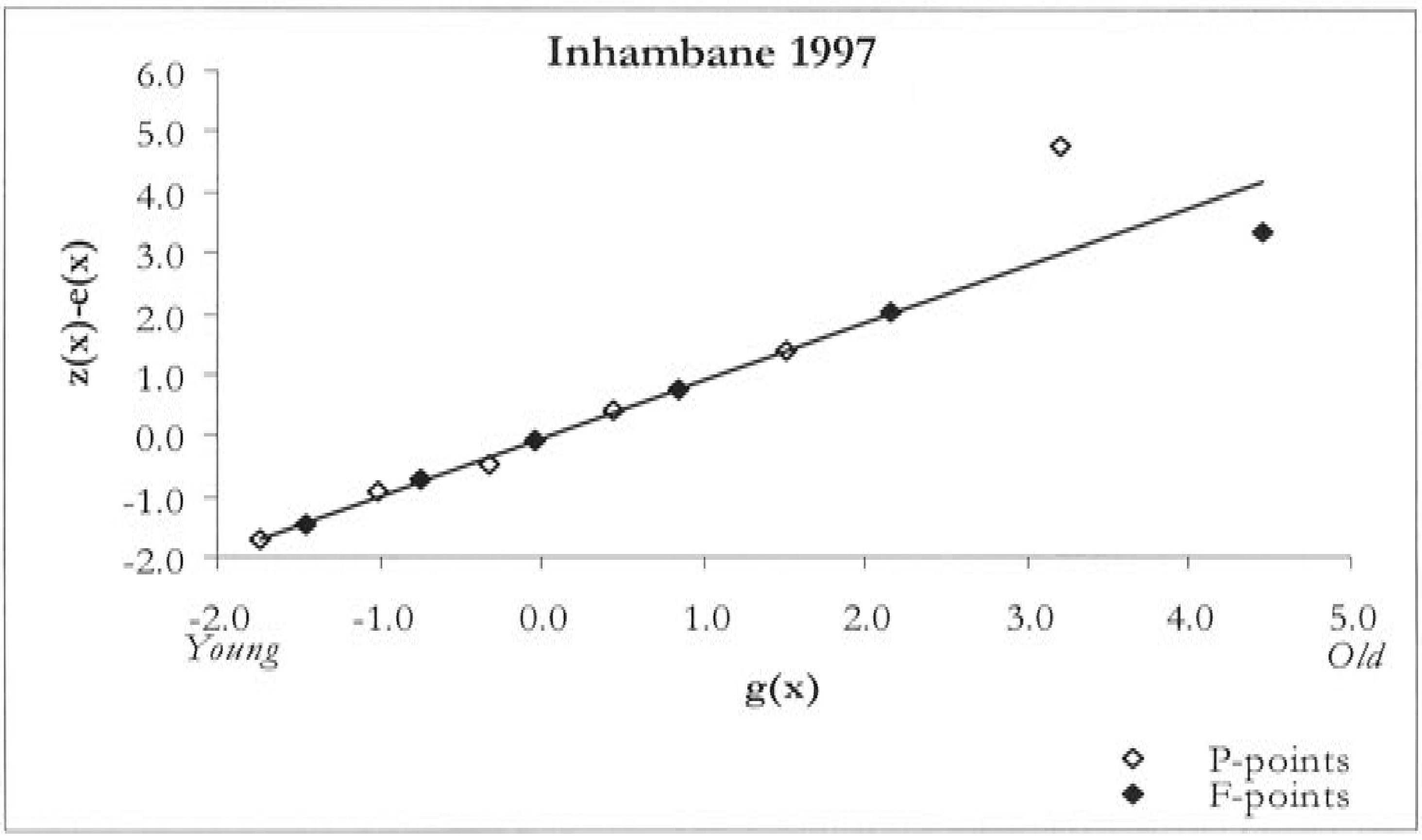
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
-2.0
-1.0
0.0
1.0
2.0
3.0
4.0
5.0
Young
Old
g(x)
P-points
F-points


Tete 1997
z(x)-e(x)
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
-2.0
-1.0
0.0
1.0
2.0
3.0
4.0
5.0
Young
Old
g(x)
P-points
F-points

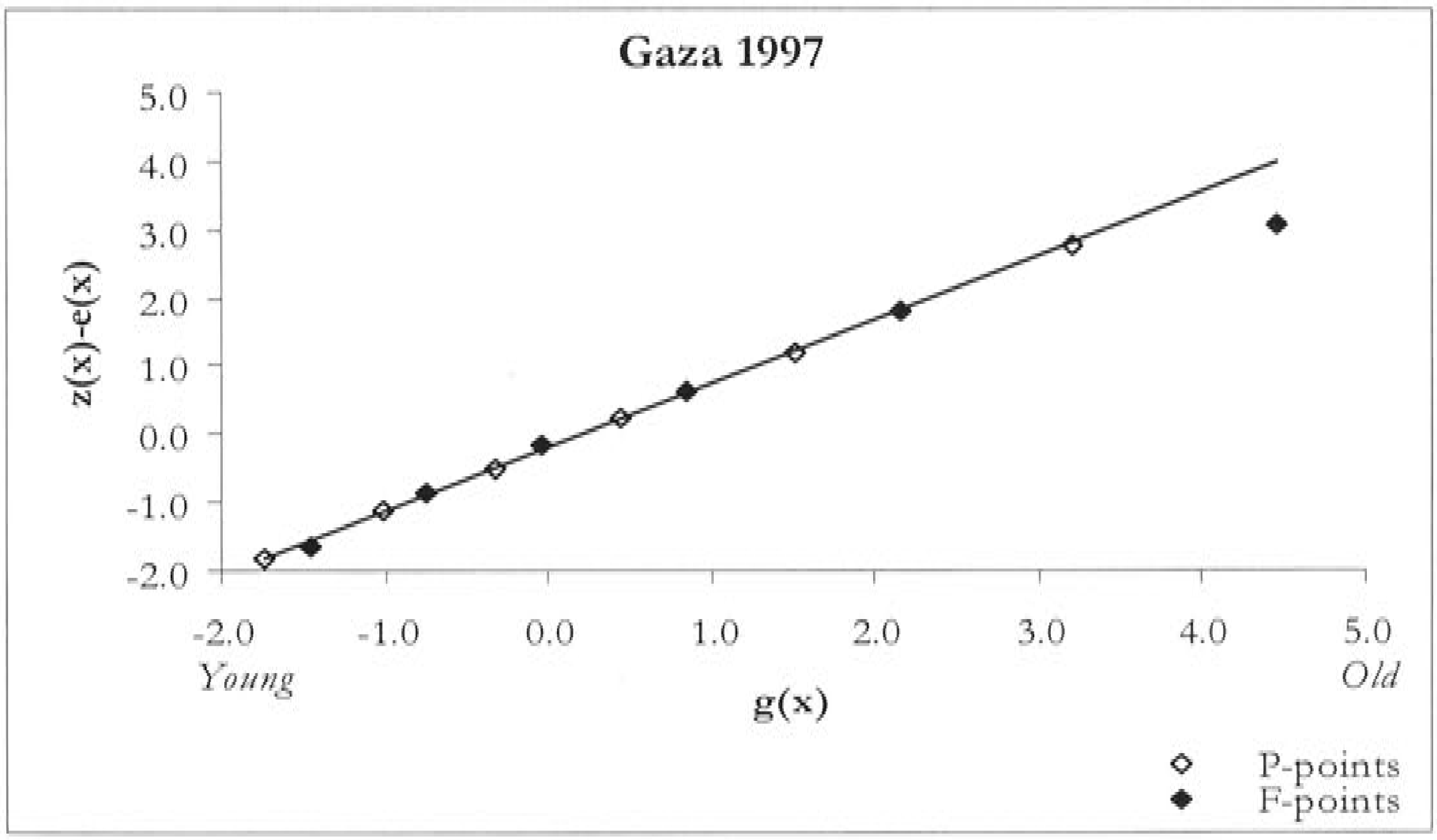

Manica 1997
z(x)-e(x)
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
-2.0
-1.0
0.0
1.0
2.0
3.0
4.0
5.0
Young
Old
g(x)
P-points
F-points



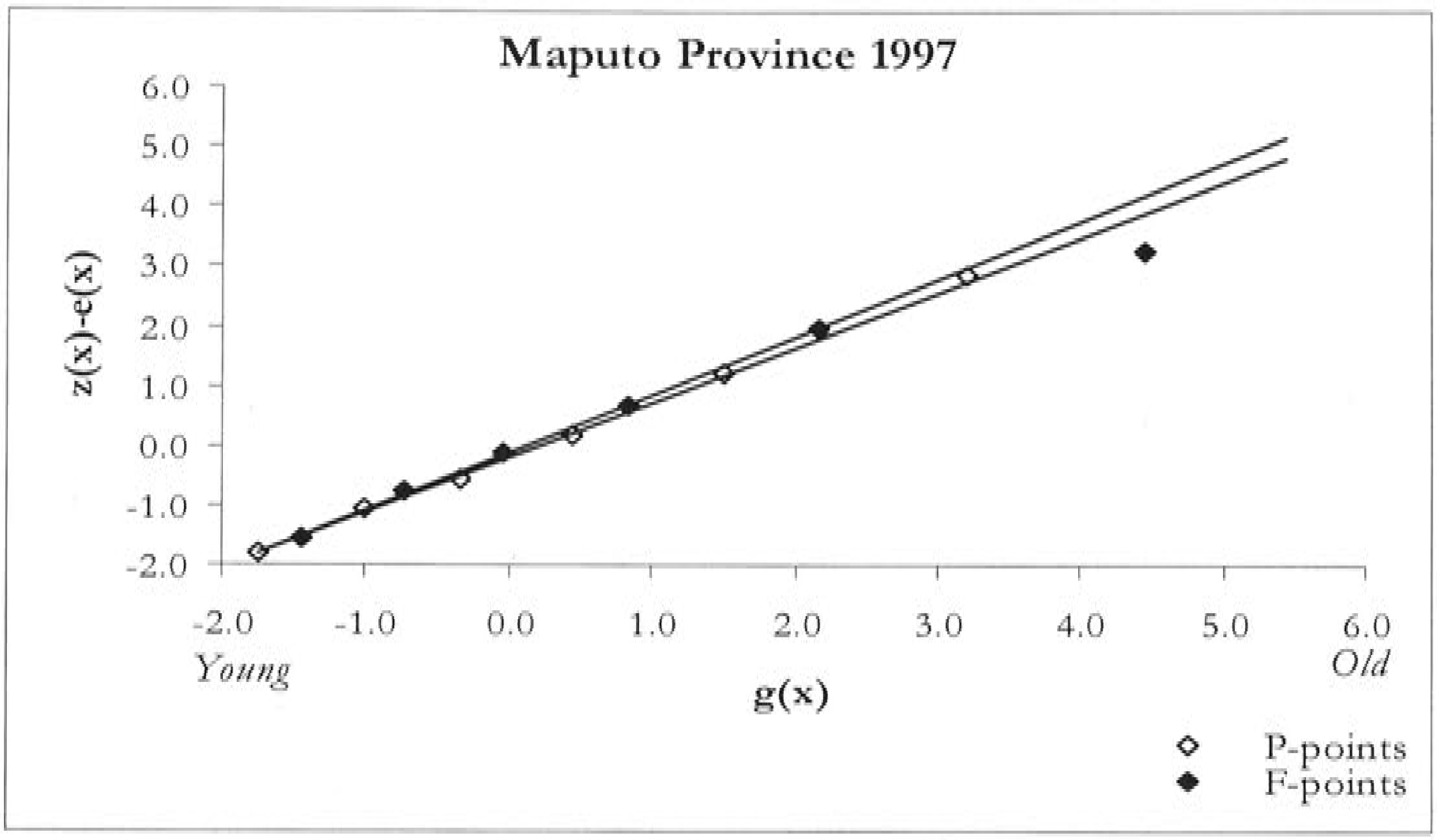
Sofala 1997
6.0
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
z(x)-e(x)
-2.0
-1.0
0.0
1.0
2.0
3.0
4.0
5.0
Young
Old
g(x)
P-points
F-points



Inhambane 1997
6.0
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
z(x)-e(x)
-2.0
-1.0
0.0
1.0
2.0
3.0
4.0
5.0
Young
Old
g(x)
P-points
F-points

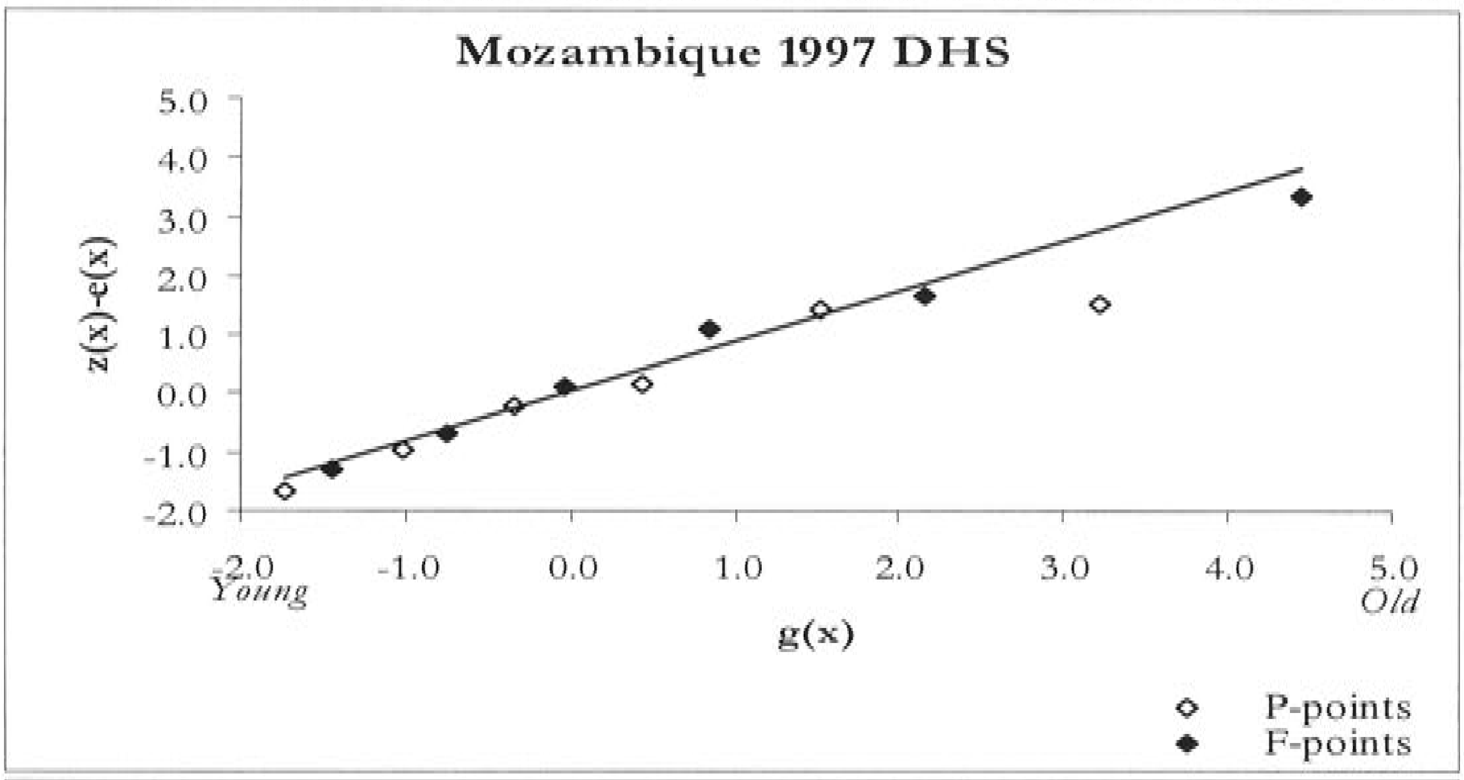


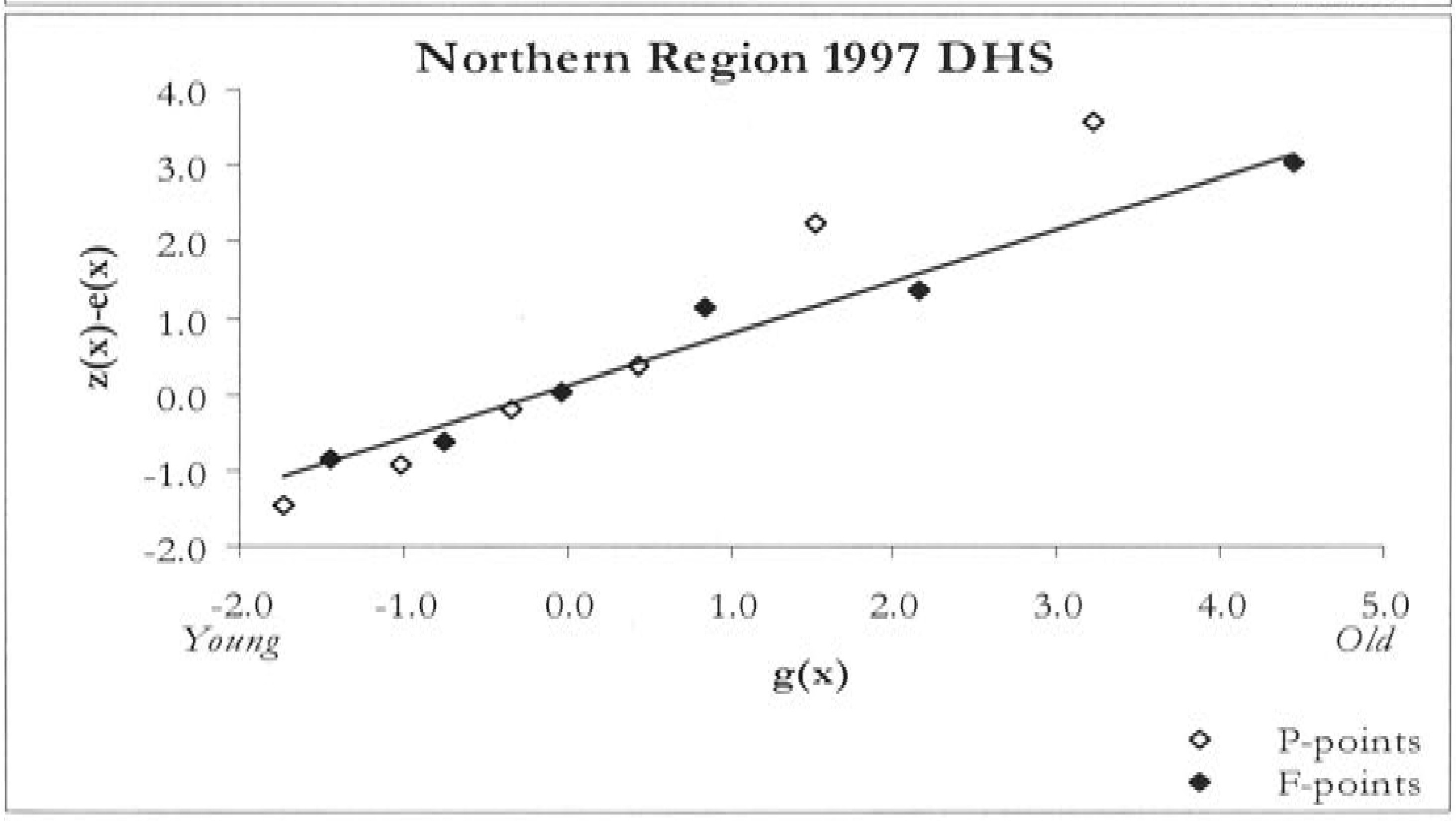
Gaza 1997
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
z(x)-e(x)
-2.0
-1.0
0.0
1.0
2.0
3.0
4.0
5.0
Young
Old
g(x)
P-points
F-points

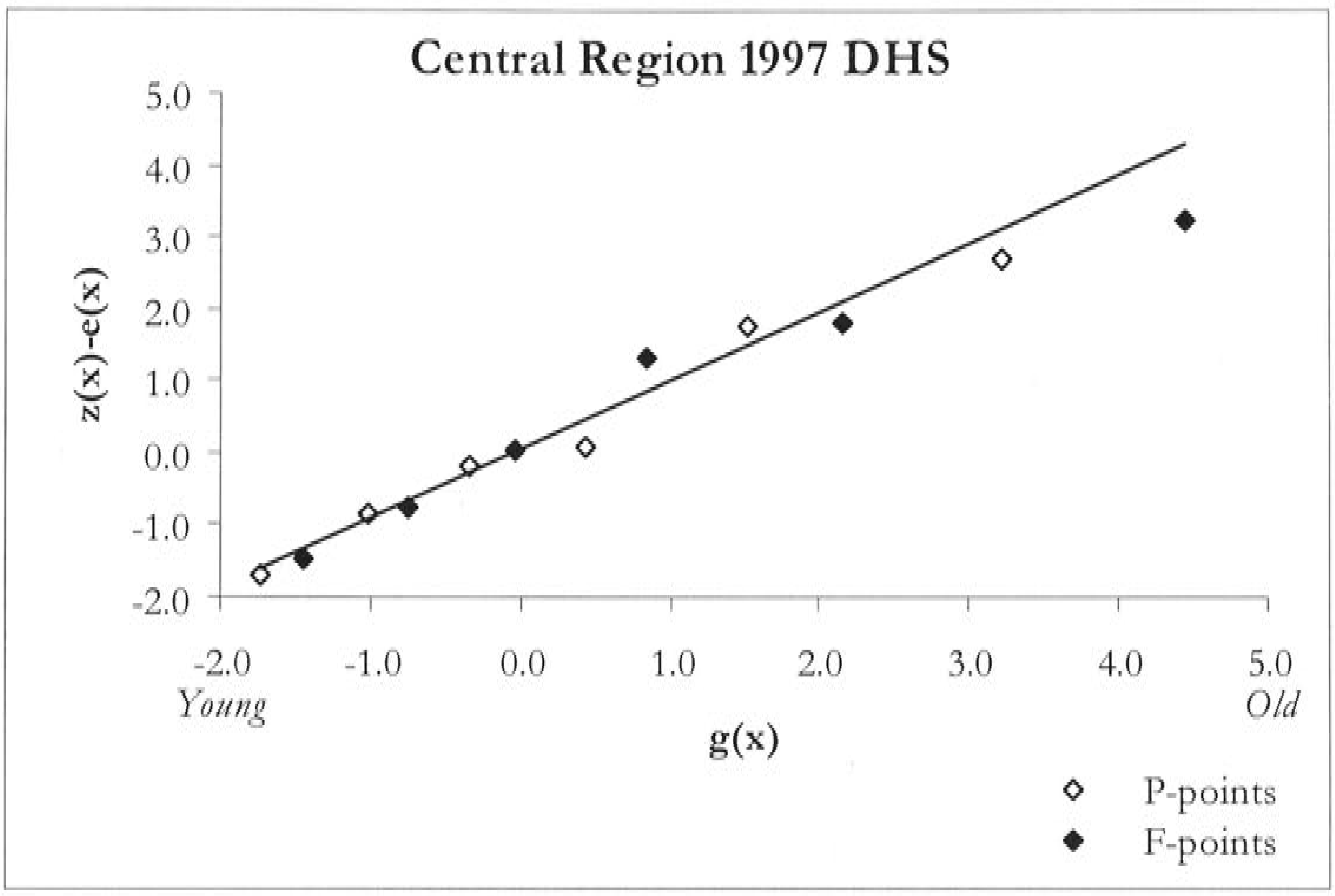


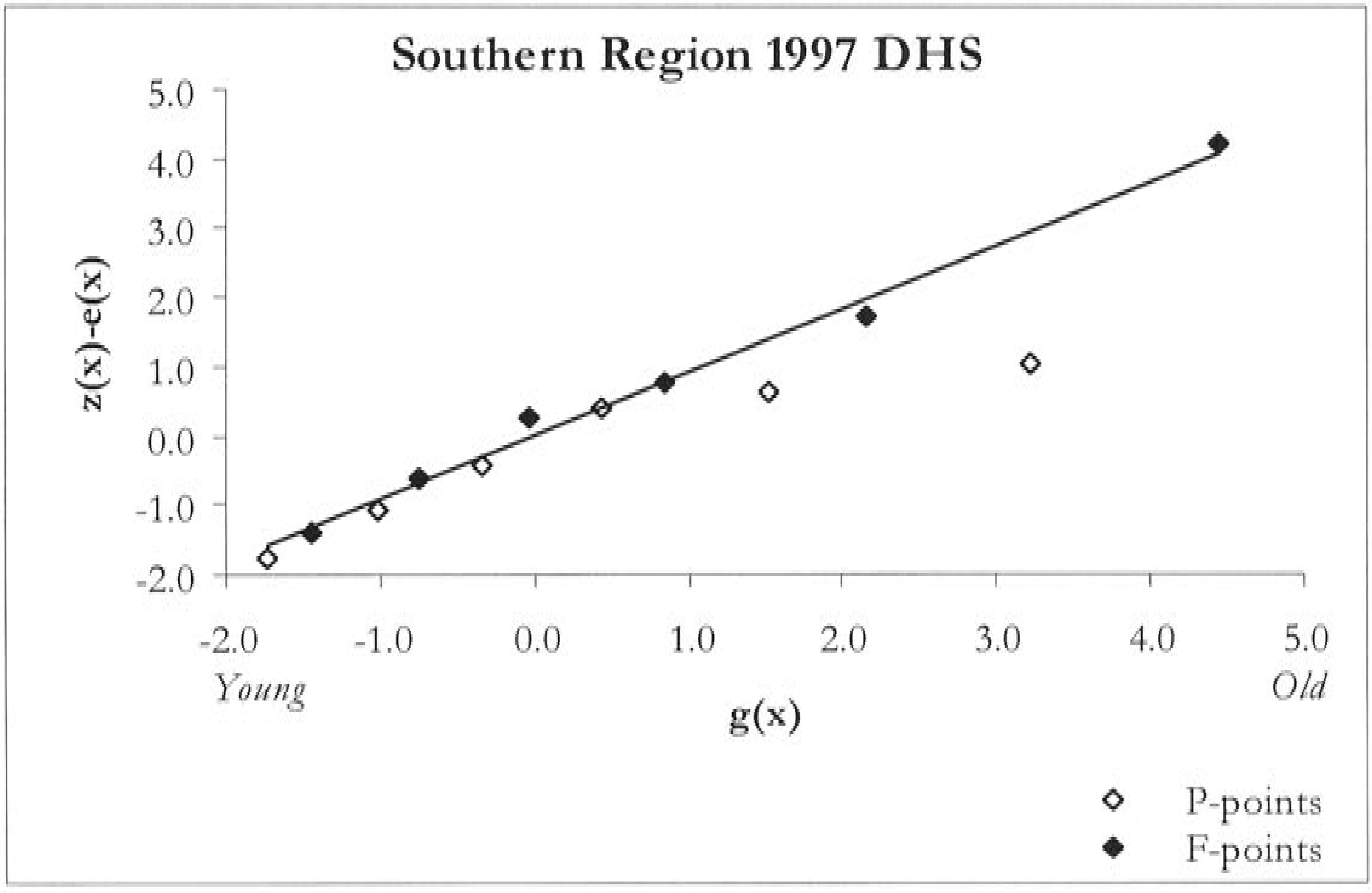
Source: Computed from 1997 Census.

Figure C3.1c Fit of the Relational Gompertz Model, Mozambique 1997 DHS









Source: Computed from 1997 DHS.

Table C3.2 Unmatched children by province, Mozambique 1997

Region/Province	% Unmatched children
Northern	**23.3**
Niassa	18.5
Cabo Delgado	22.2
Nampula	25.1
Central	**15.9**
Zambézia	16.7
Tete	13.5
Manica	16.2
Sofala	16.4
Southern	**19.6**
Inhambane	22.9
Gaza	18.8
Maputo Province	19.2
Maputo City	16.8
Mozambique	**19.2**

Source: Computed from 1997 Census.

Table C3.3 Coale and Demeny West Mortality Level, $_5q_0$ and e_0 by sex, region and province, Mozambique 1983-1997

Region/Province	West Mortality level	Female		Male	
		$_5q_0$	e_0	$_5q_0$	e_0
Northern	**9.2**	**0.270**	**40.5**	**0.296**	**37.8**
Niassa	9.8	0.257	41.9	0.282	39.1
Cabo Delgado	8.7	0.284	39.2	0.311	36.5
Nampula	9.3	0.267	40.8	0.293	38.1
Central	**9.3**	**0.267**	**40.8**	**0.293**	**38.1**
Zambézia	8.0	0.300	37.6	0.328	35.0
Tete	10.7	0.235	44.2	0.259	41.3
Manica	10.9	0.230	44.7	0.254	41.8
Sofala	10.6	0.236	44.1	0.260	41.2
Southern	**13.6**	**0.168**	**51.6**	**0.187**	**48.6**
Inhambane	12.4	0.195	48.6	0.216	45.6
Gaza	12.1	0.202	47.8	0.224	44.8
Maputo Province	14.5	0.149	53.9	0.167	50.8
Maputo City	16.7	0.107	59.4	0.124	55.9
Mozambique	**10.2**	**0.245**	**43.1**	**0.270**	**40.3**

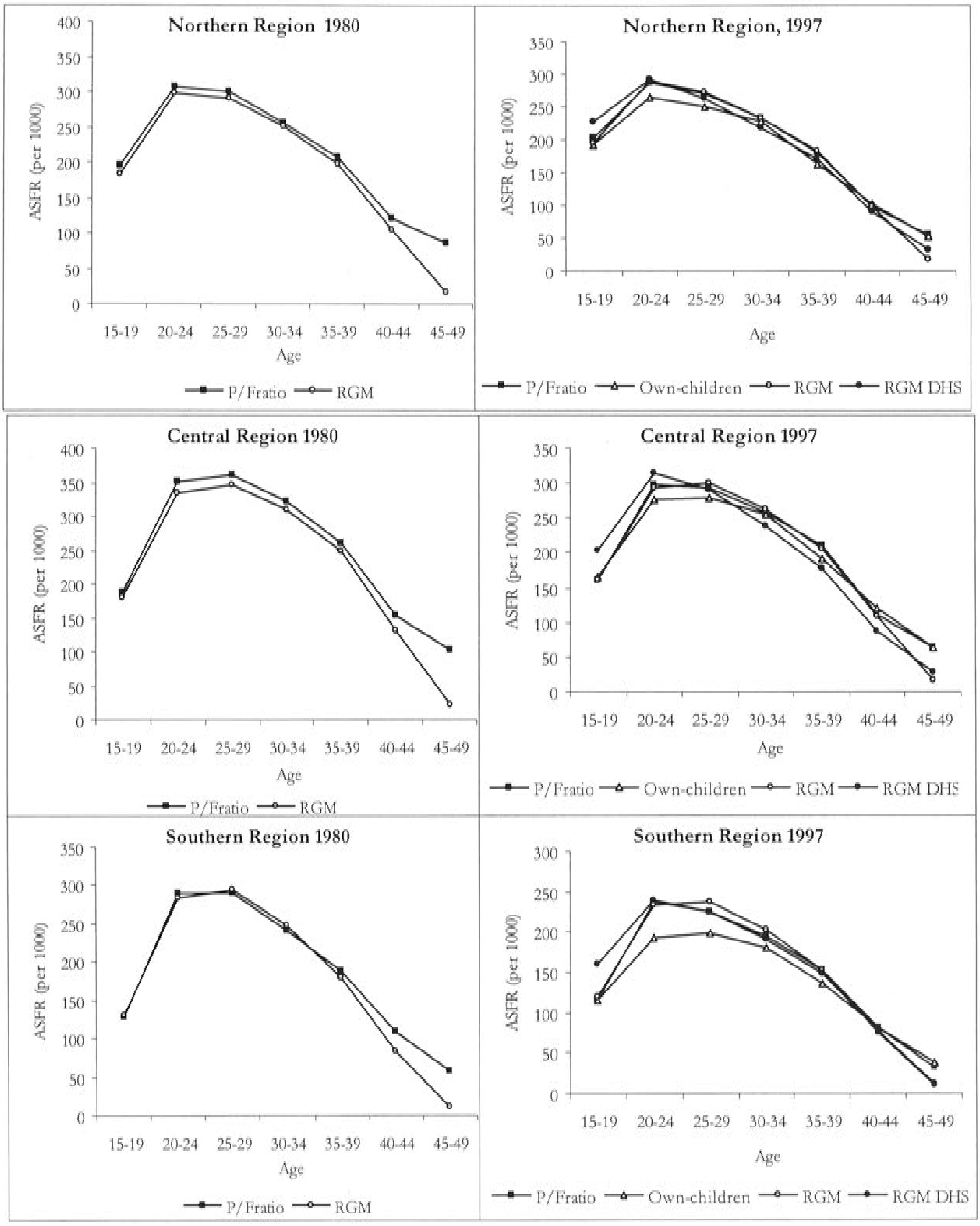
Source: Computed from 1997 Census.

Table C3.4 Own-children estimates of total fertility rate by province, Mozambique 1983-1997

Region	Total fertility rate		
	1983-87	1988-92	1993-97
Northern	**5.6**	**6.7**	**6.3**
Niassa	6.2	7.5	7.2
Cabo Delgado	5.1	6.2	5.6
Nampula	5.6	6.8	6.4
Central	**6.5**	**6.8**	**6.8**
Zambézia	6.4	6.6	6.9
Tete	6.9	7.6	7.2
Manica	6.9	7.1	6.6
Sofala	6.1	6.1	6.1
Southern	**6.0**	**5.2**	**4.7**
Inhambane	5.7	5.3	5.0
Gaza	6.2	5.7	5.2
Maputo Province	6.1	5.3	4.7
Maputo City	6.1	4.5	3.8
Mozambique	**6.1**	**6.3**	**6.0**

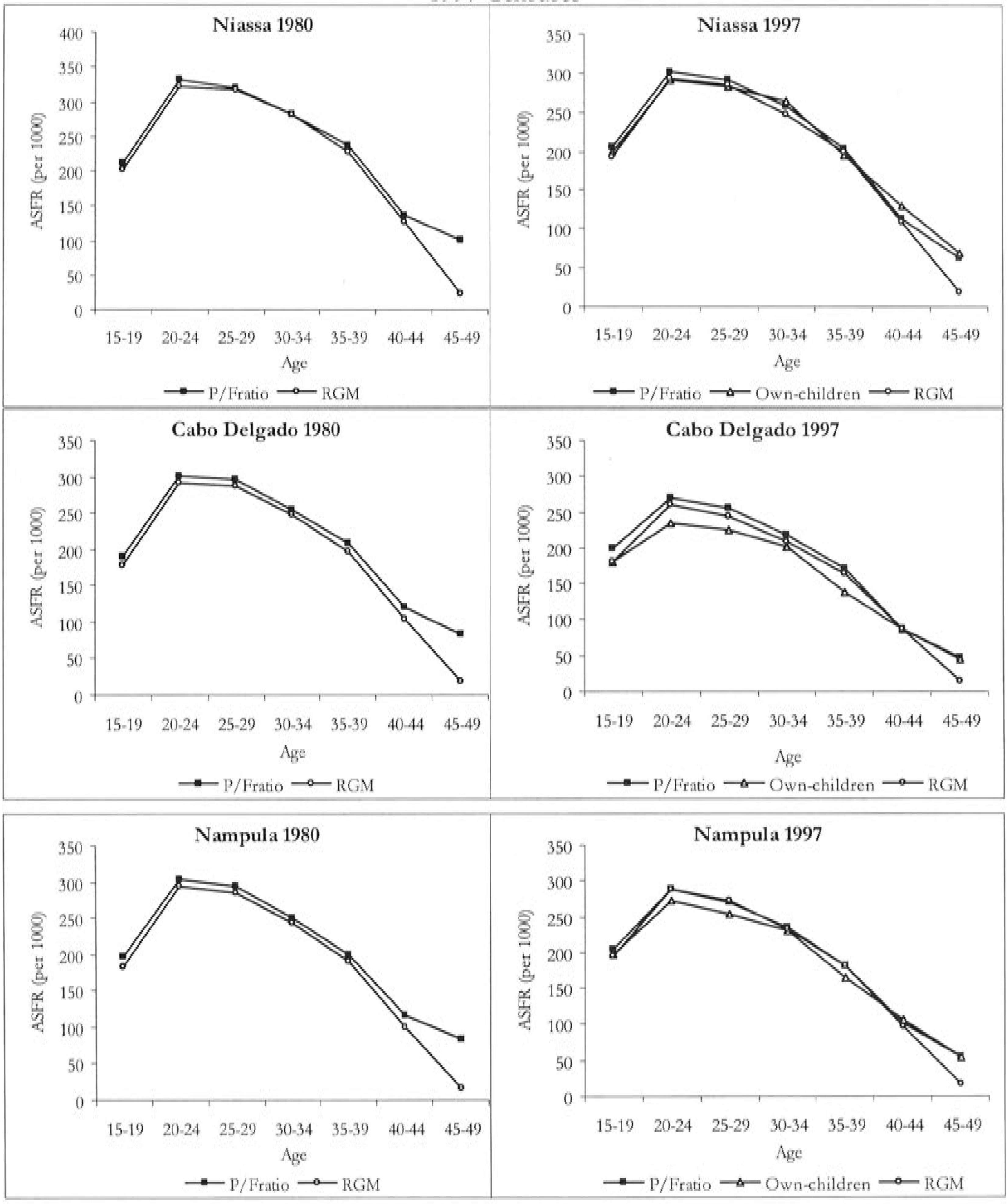
Source: Computed from 1997 Census.

Figure C3.2.1 Estimated age-specific fertility rates by Region, Mozambique 1980 and 1997

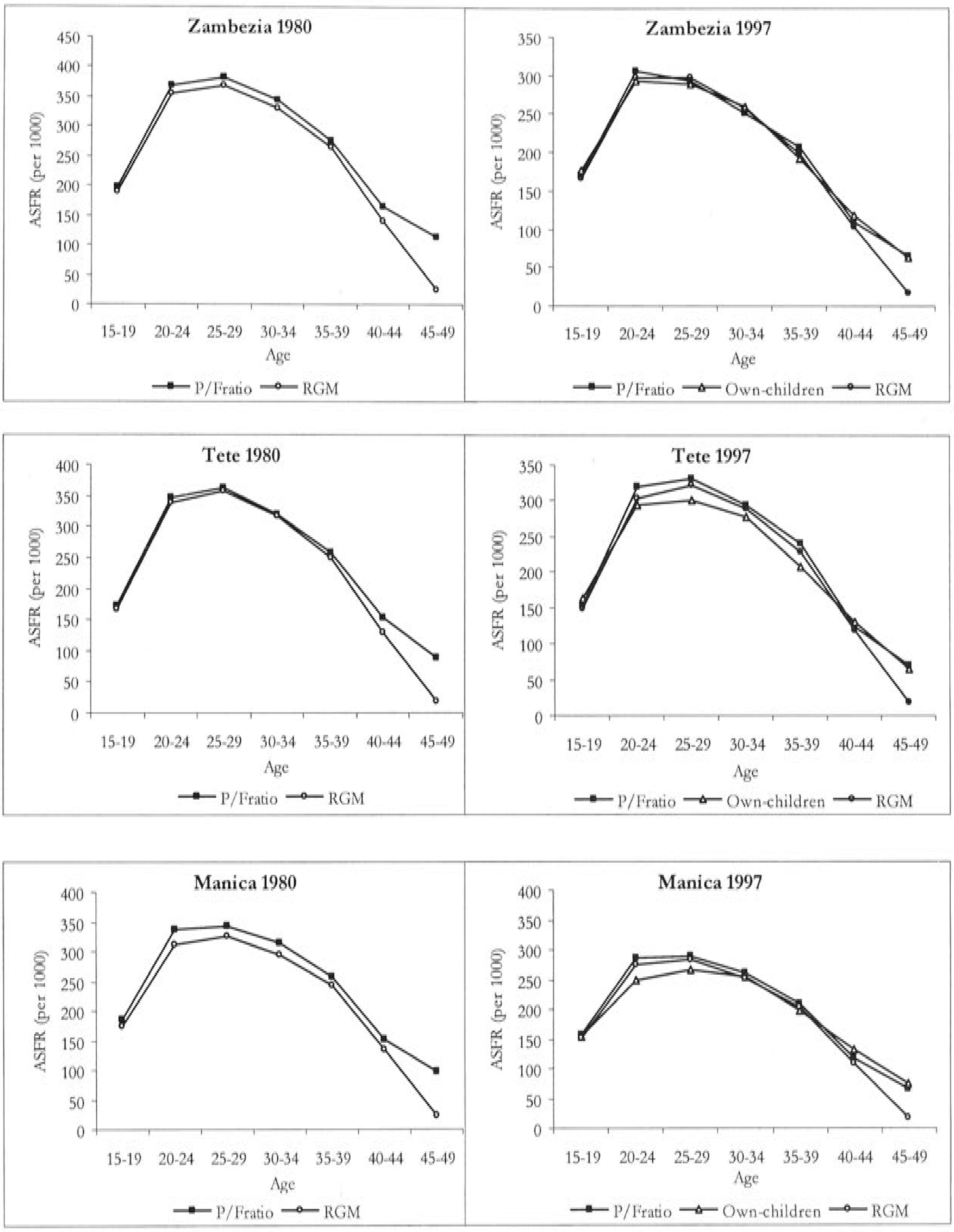


Note: Own-children estimates refer to the last 5 years.
Source: Computed by author.

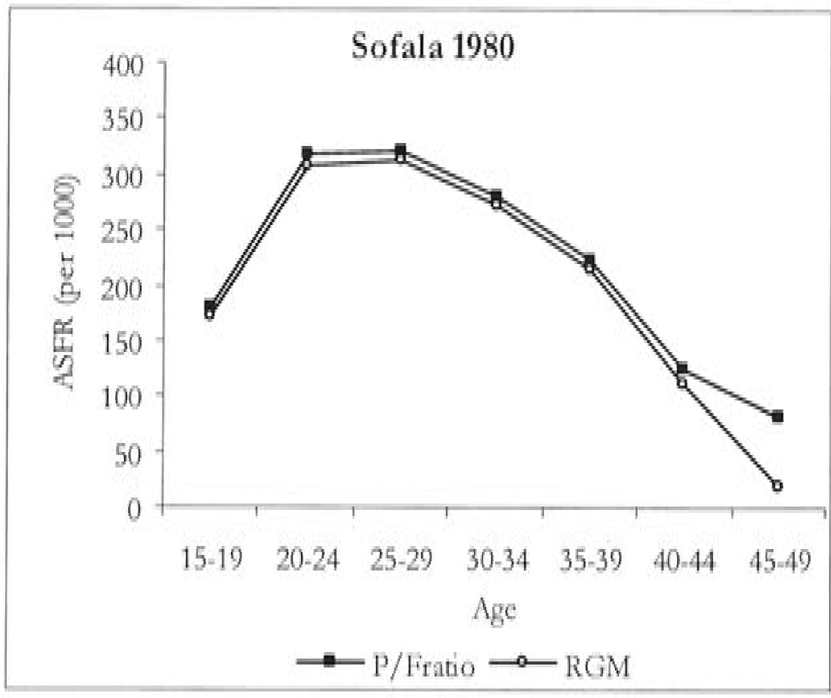
Figure C3.2.2 Adjusted age-specific fertility rates by province, Mozambique 1980 and 1997 Censuses

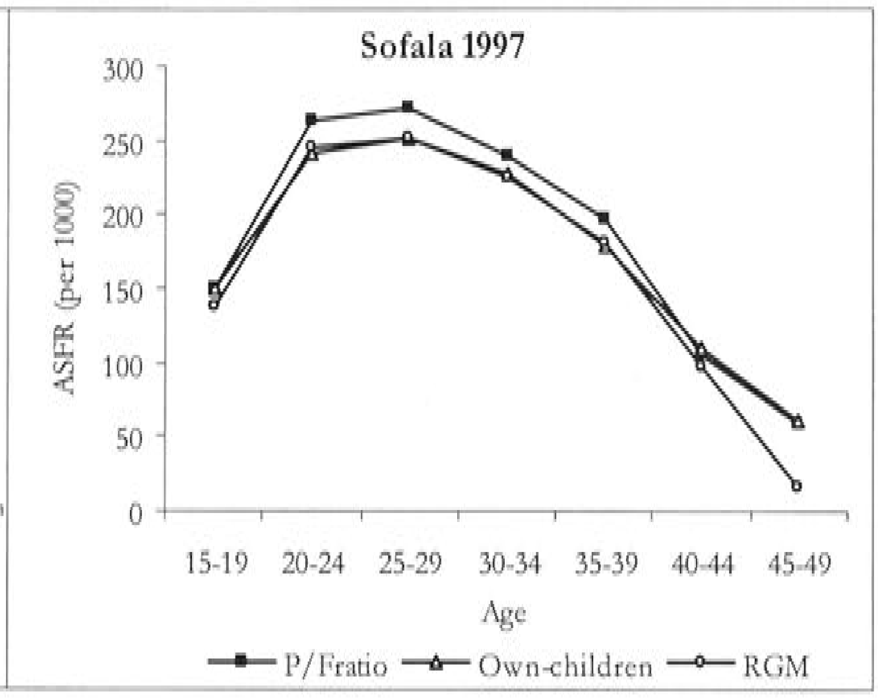


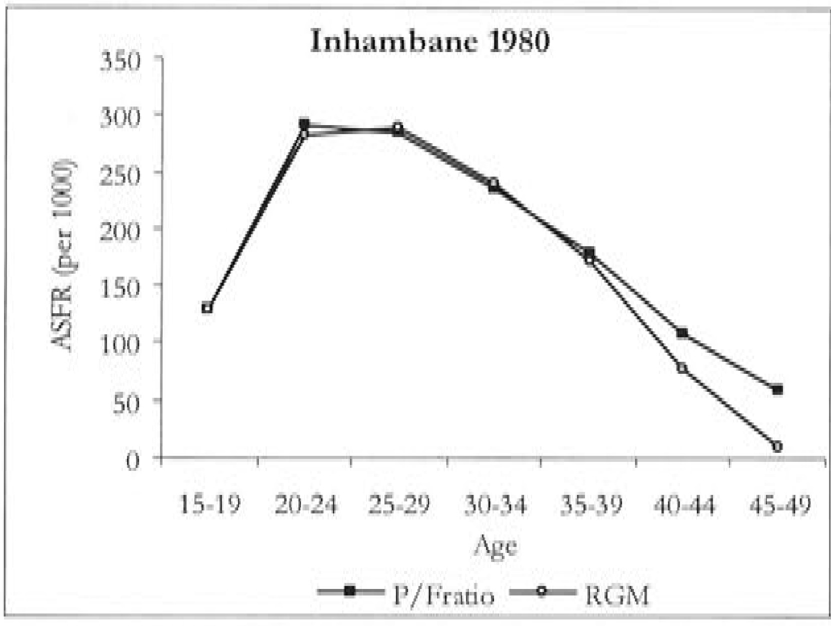
Note: Own-children estimates refer to the last 5 years.
Source: Computed from 1980 and 1997 Censuses.

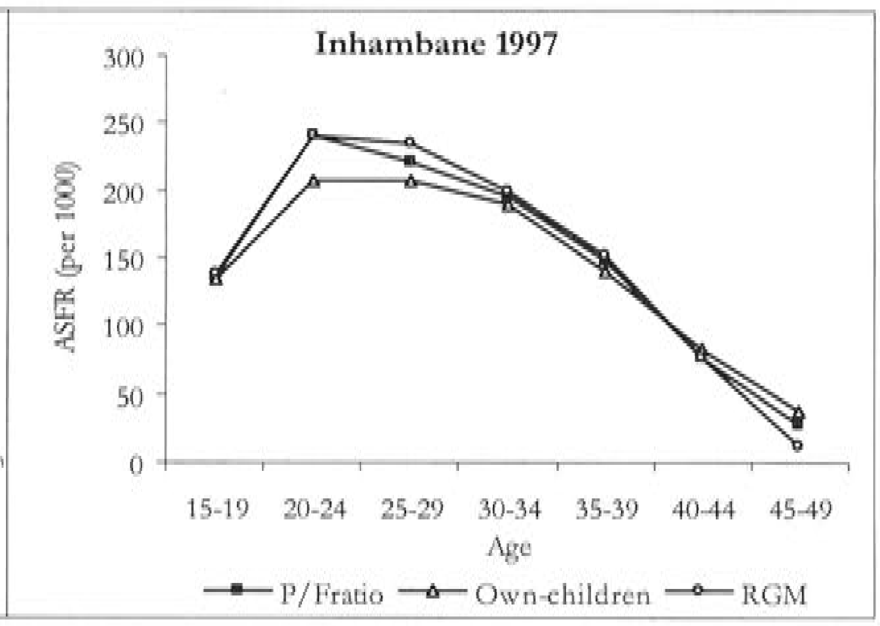


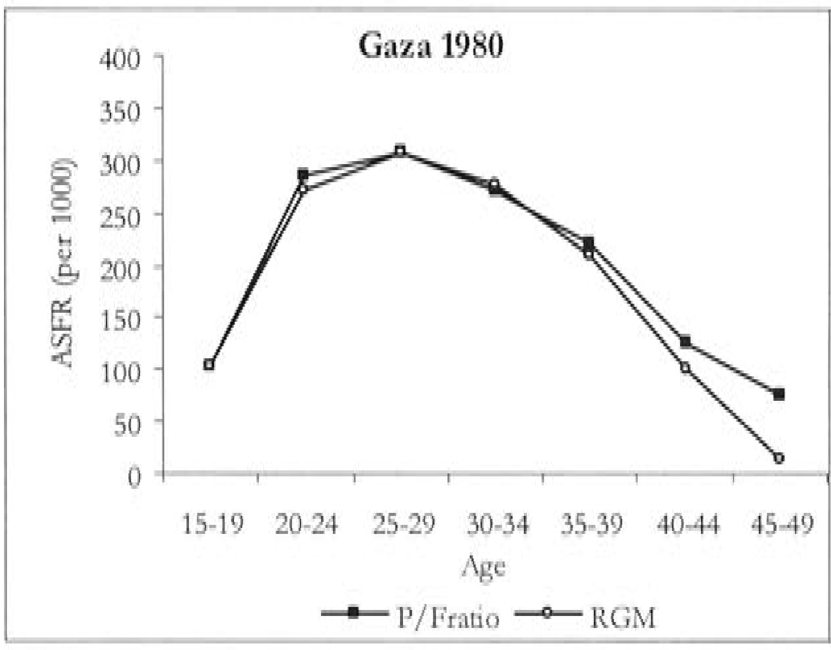
Note: Own-children estimates refer to the last 5 years.
Source: Computed from 1980 and 1997 Censuses.

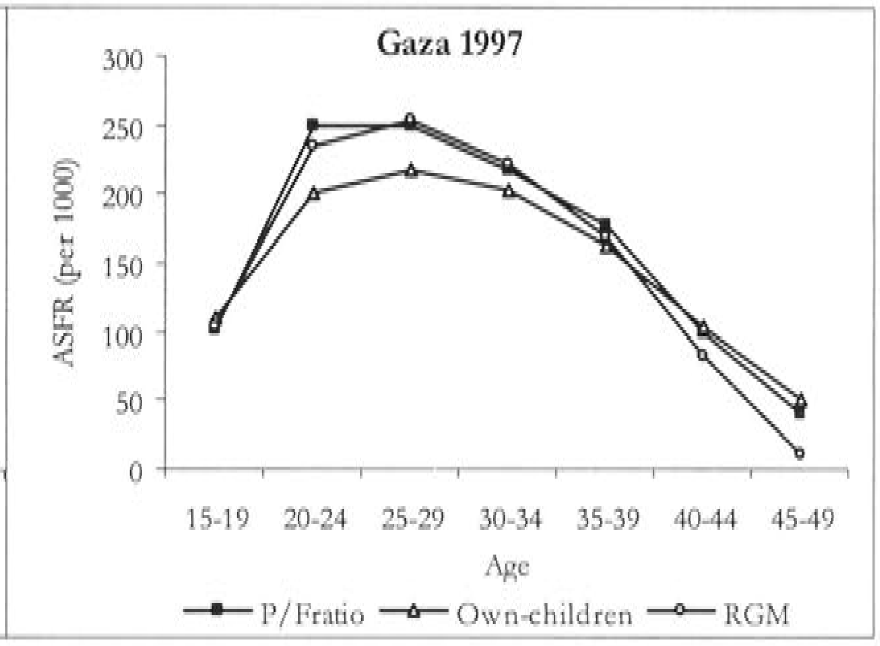




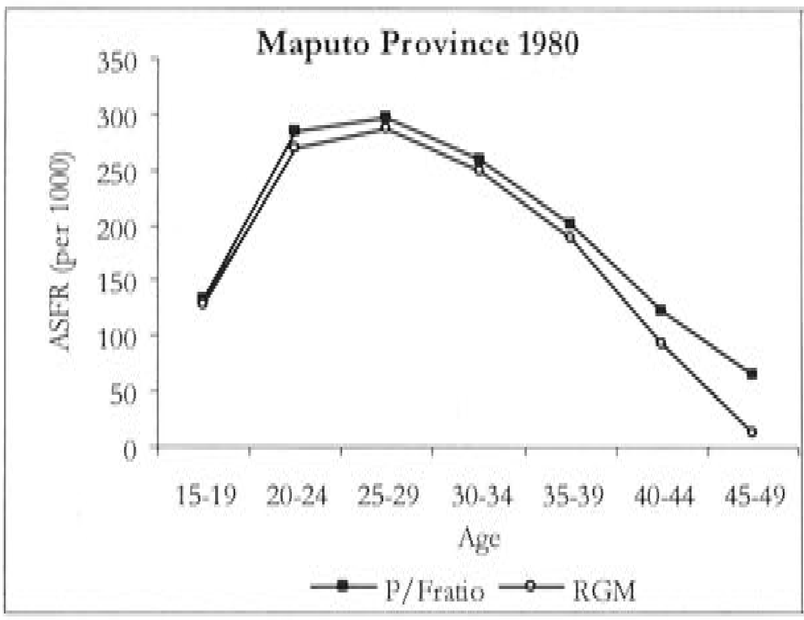


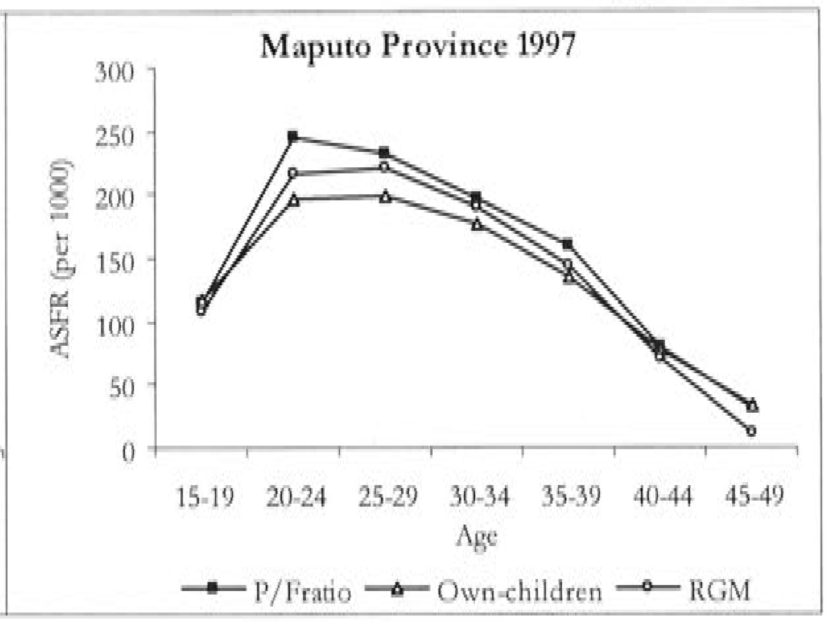


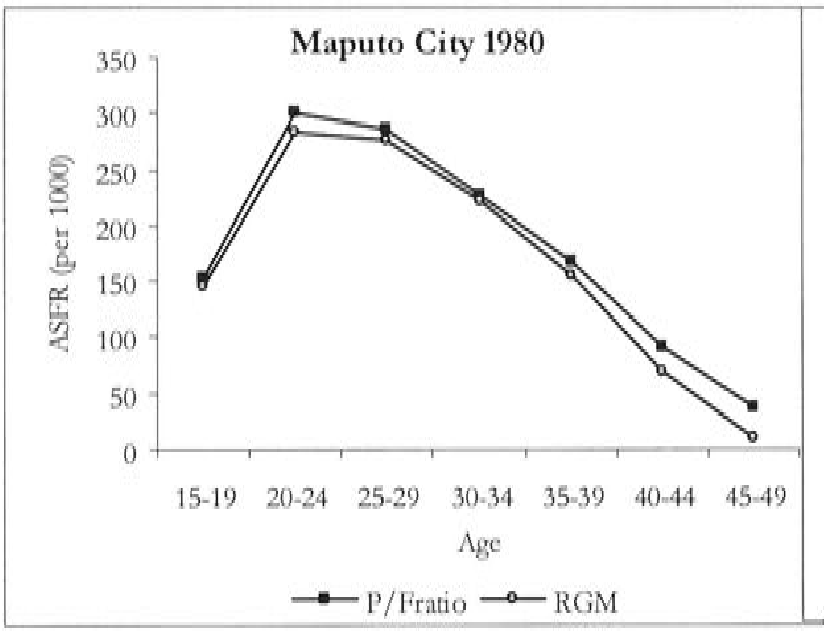


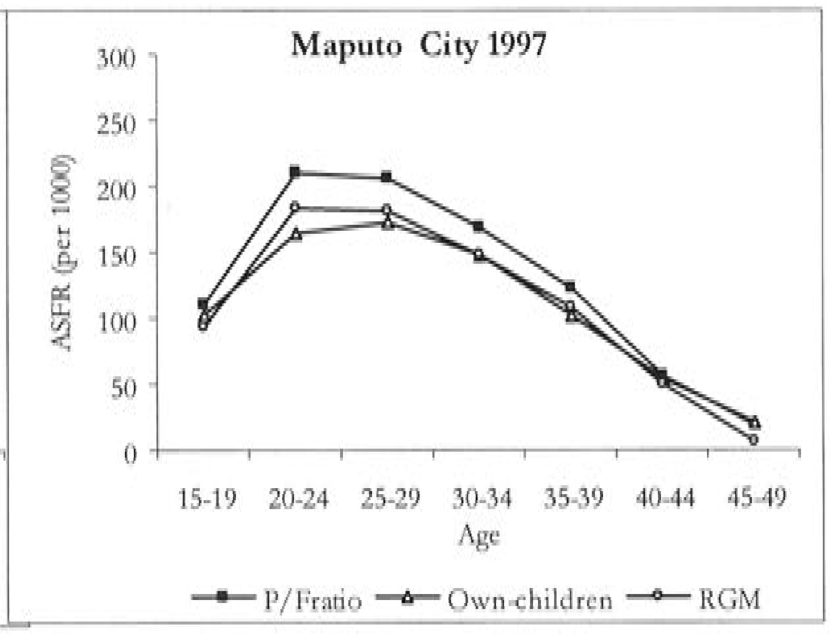


Note: Own-children estimates refer to the last 5 years.
Source: Computed from 1980 and 1997 Censuses.



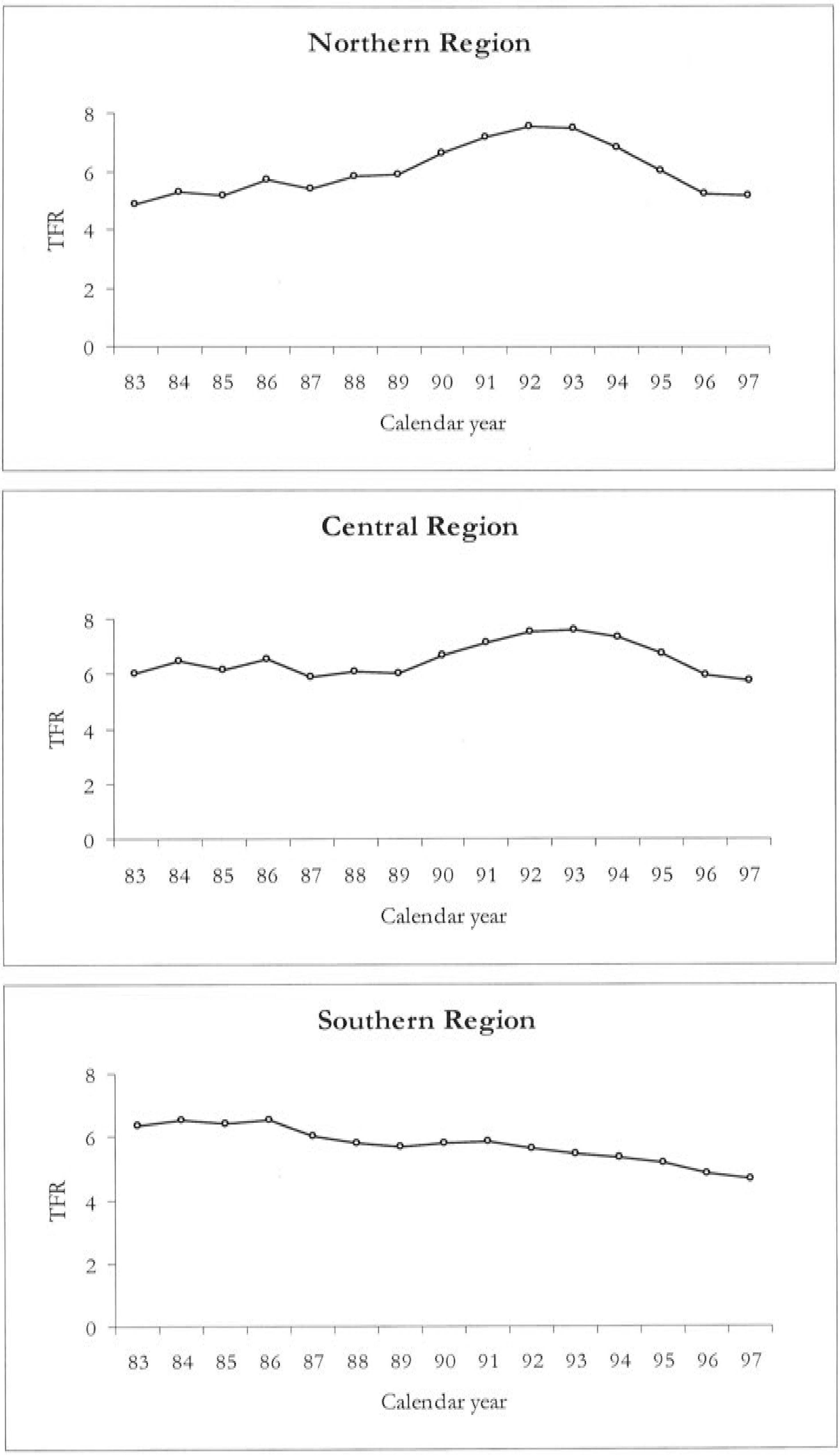


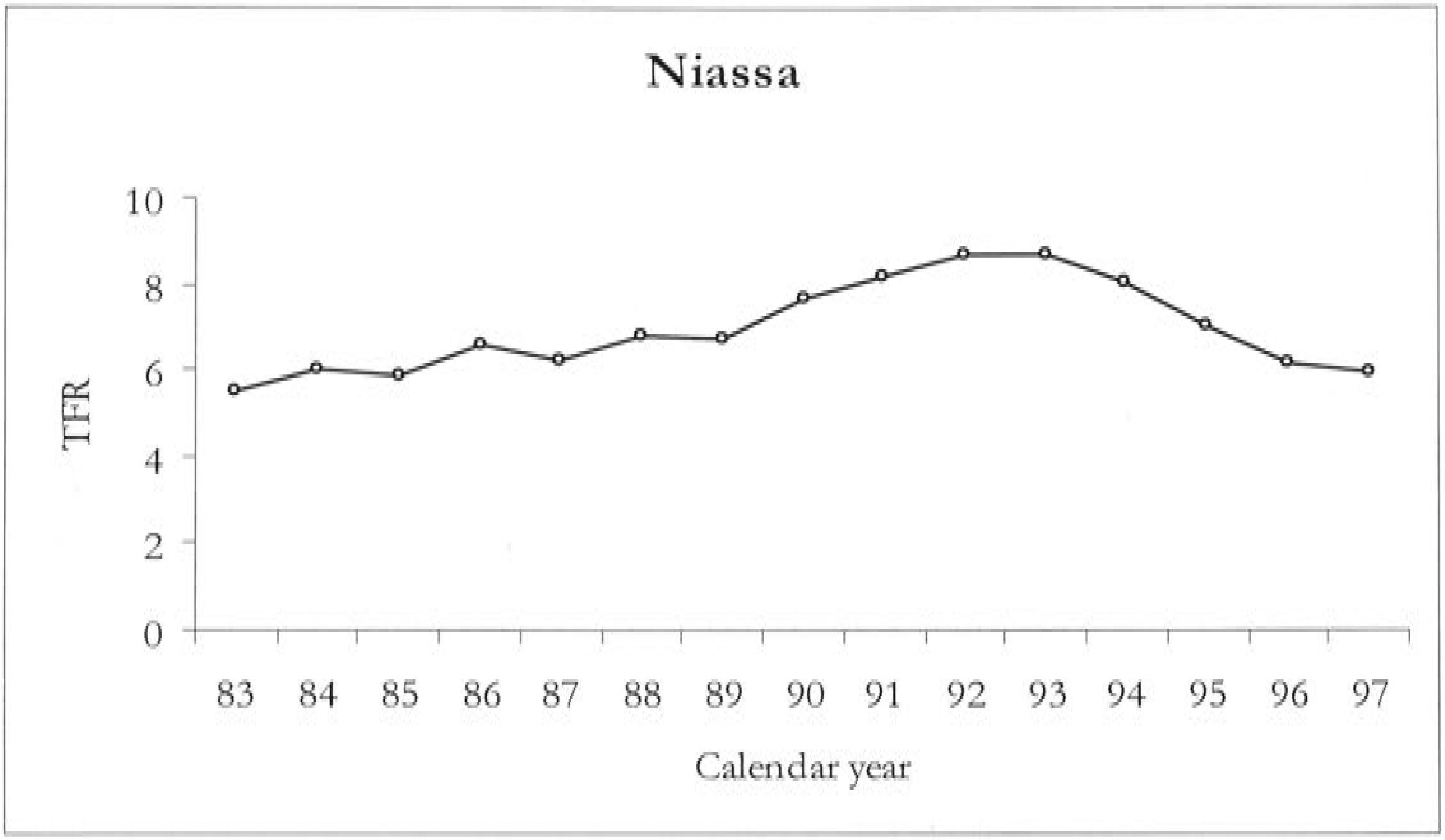


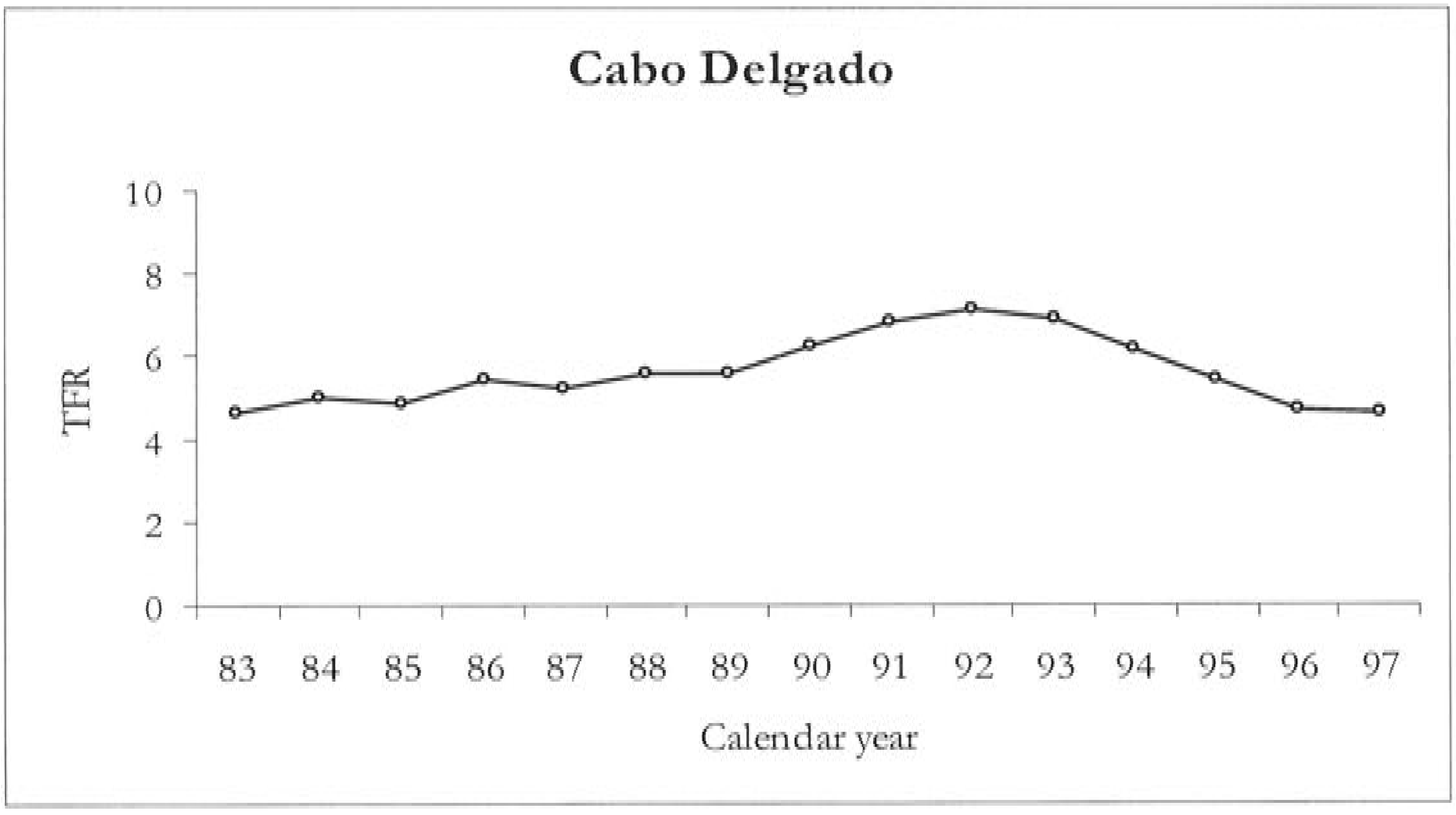


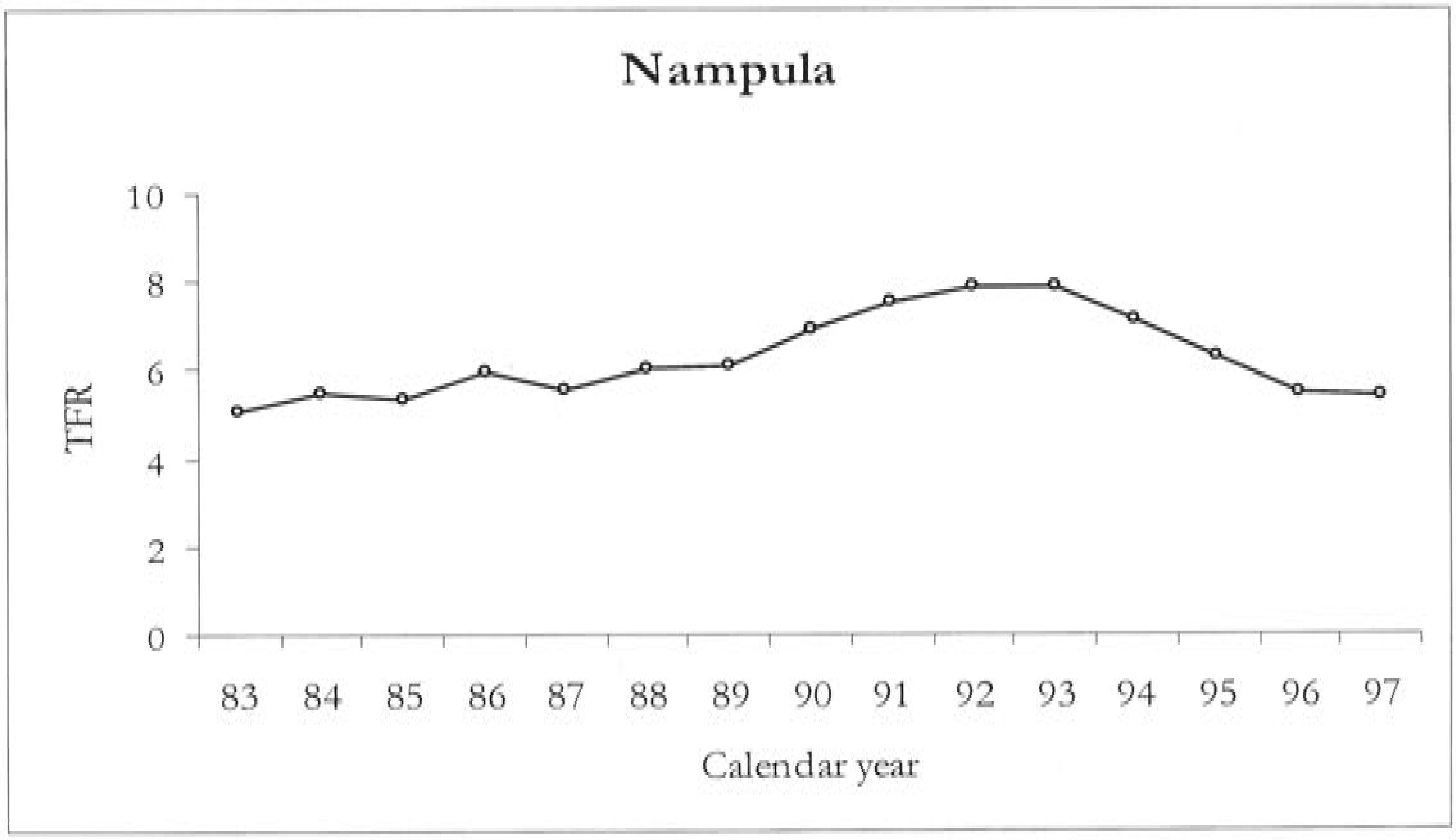
Note: Own-children estimates refer to the last 5 years.
Source: Computed from 1980 and 1997 Censuses.

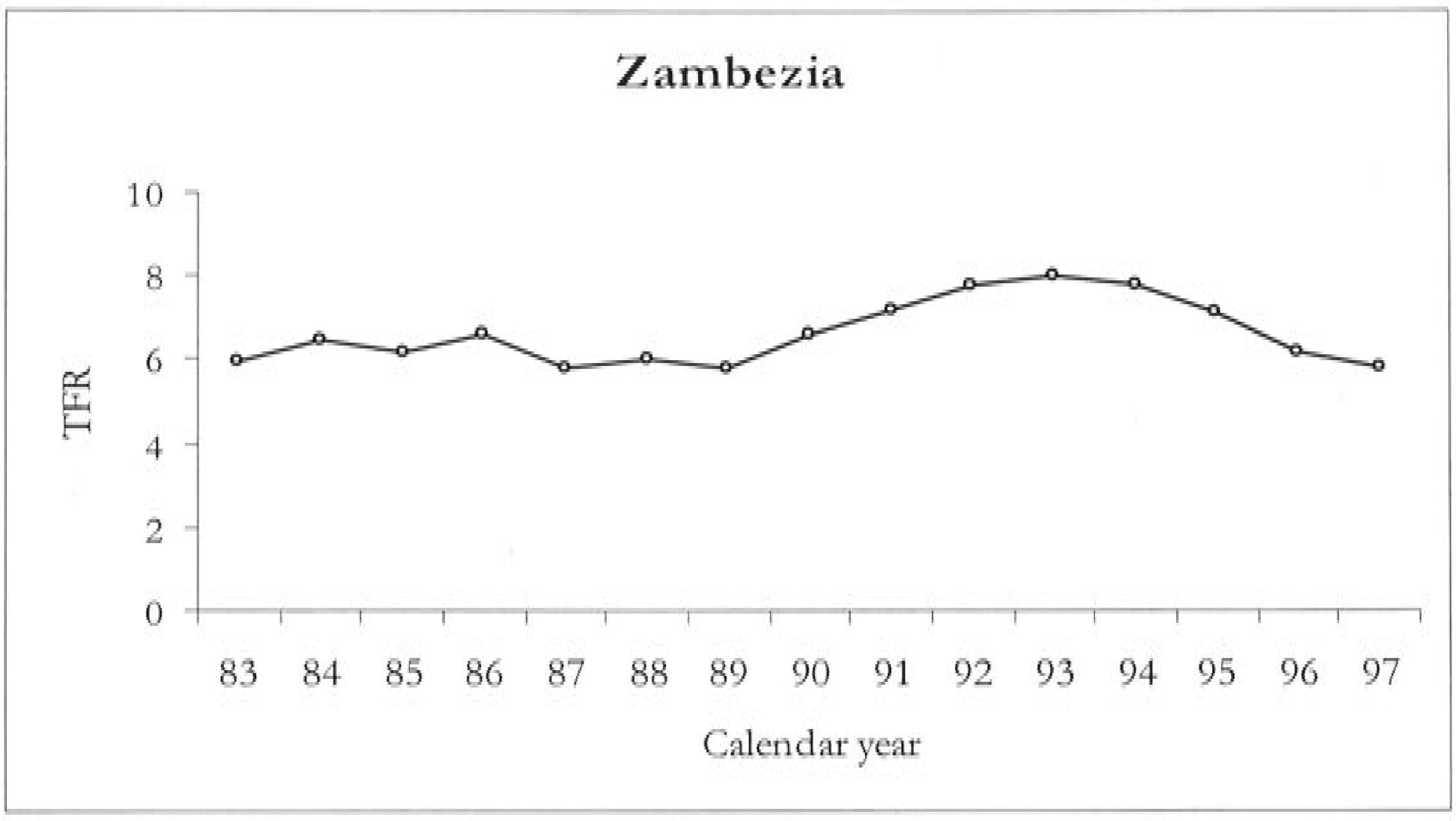
Figure C3.3.1 Own-children estimates of total fertility rate, Mozambique 1983-1997

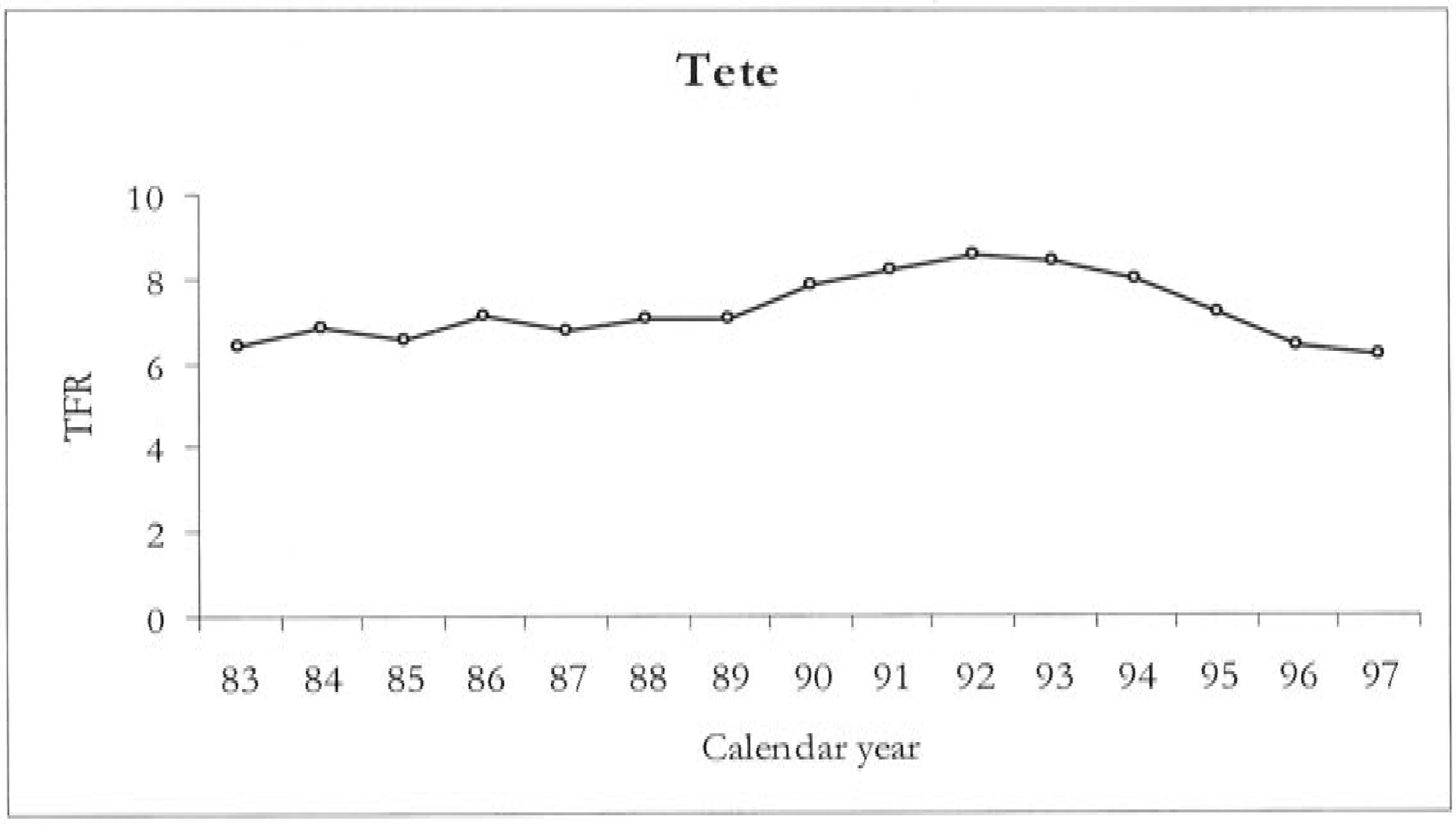


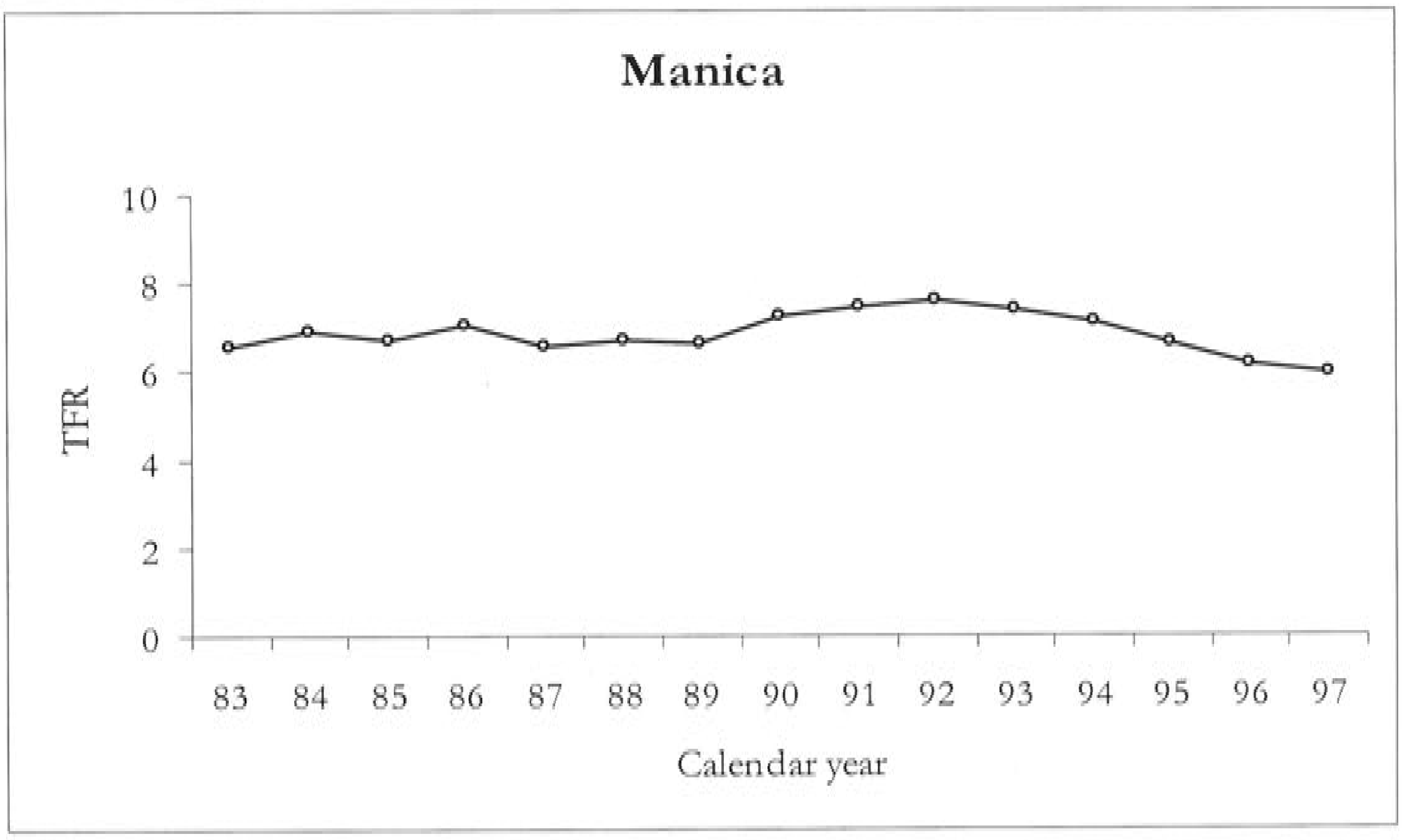

Niassa
10
8
6
4
2
0
TFR
83 84 85 86 87 88 89 90 91 92 93 94 95 96 97
Calendar year

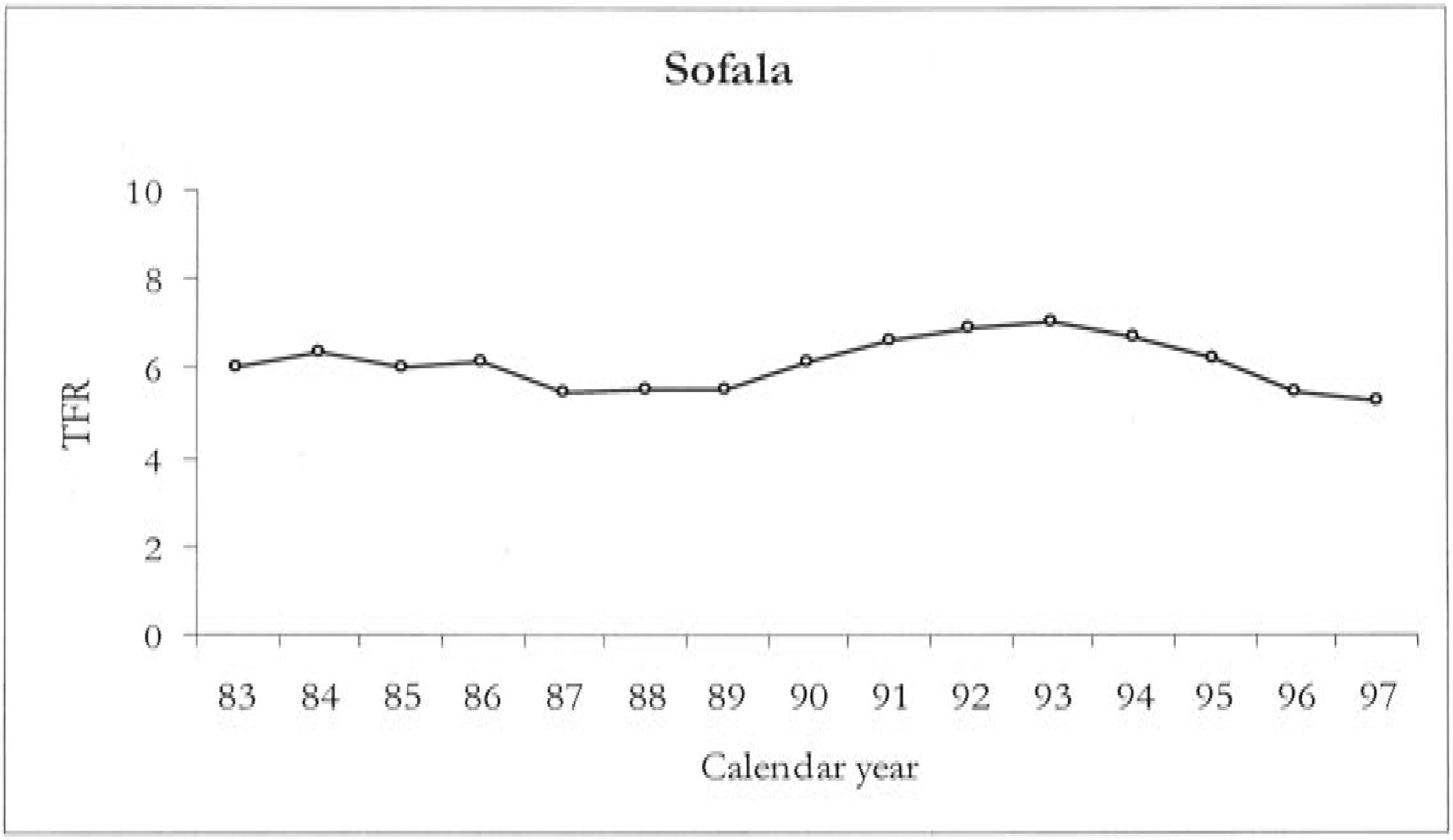

Cabo Delgado
10
8
6
4
2
0
TFR
83 84 85 86 87 88 89 90 91 92 93 94 95 96 97
Calendar year

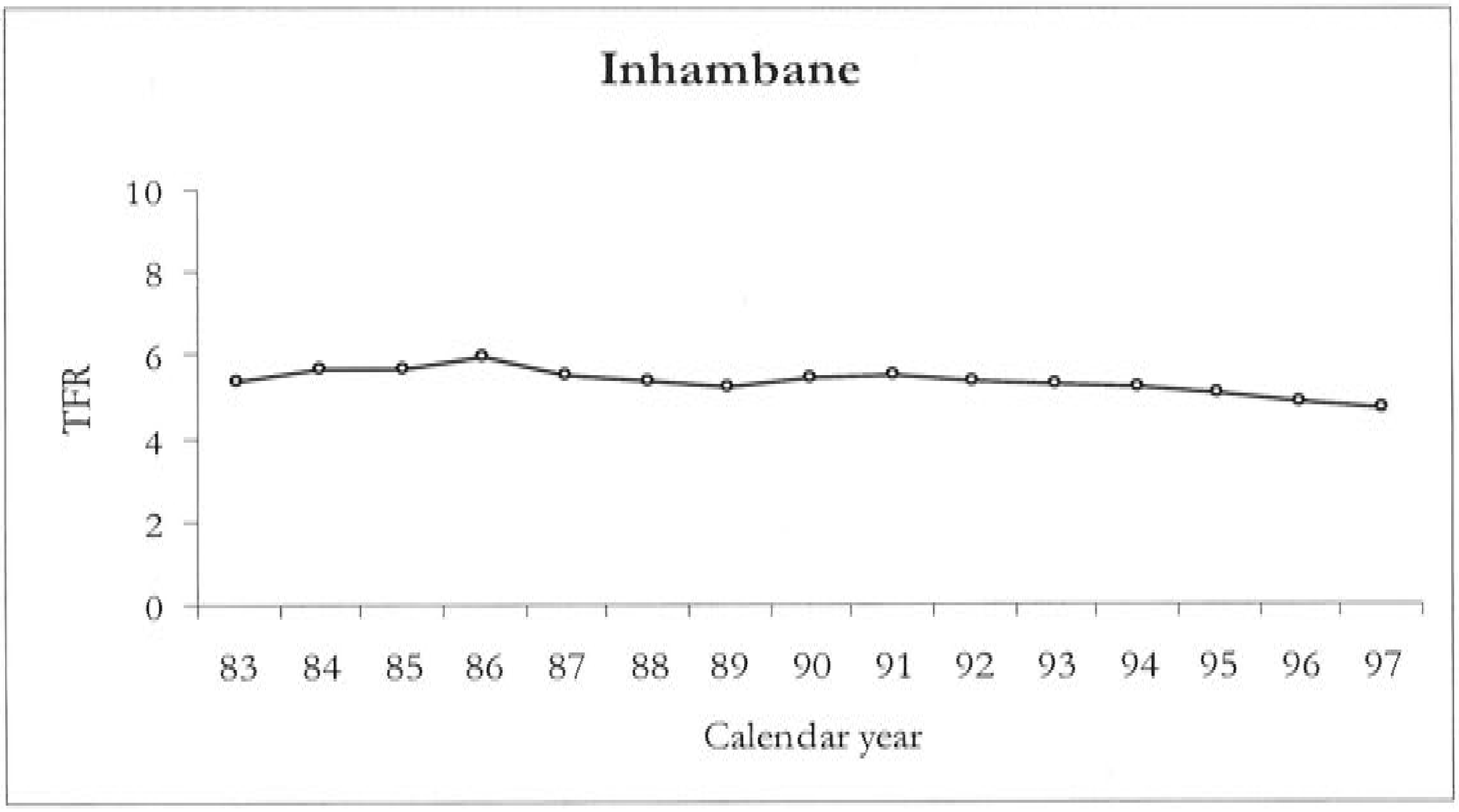

Nampula
10
8
6
4
2
0
TFR
83 84 85 86 87 88 89 90 91 92 93 94 95 96 97
Calendar year

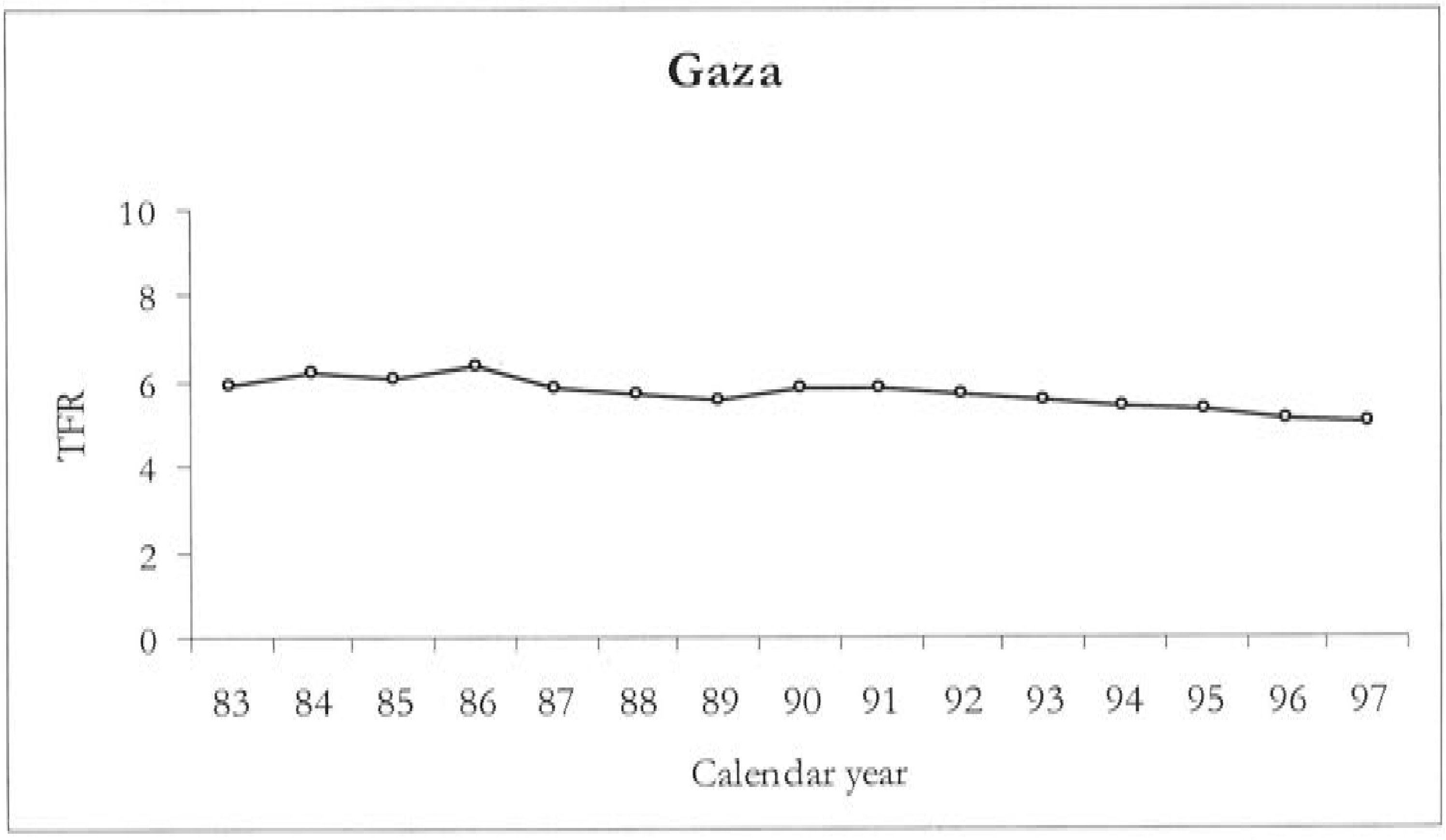

Zambezia
10
8
6
4
2
0
TFR
83 84 85 86 87 88 89 90 91 92 93 94 95 96 97
Calendar year

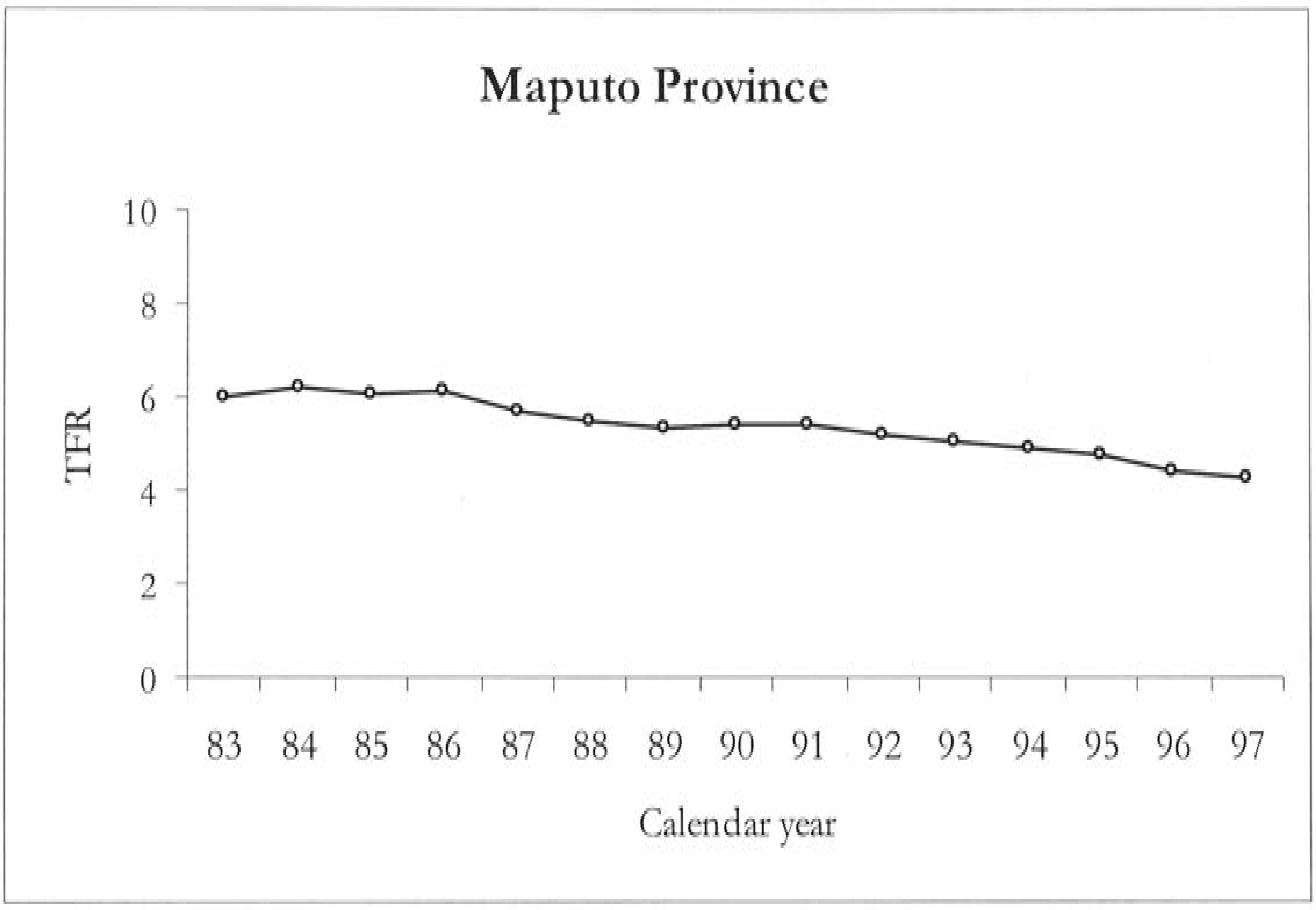

Tete
10
8
6
4
2
0
TFR
83 84 85 86 87 88 89 90 91 92 93 94 95 96 97
Calendar year

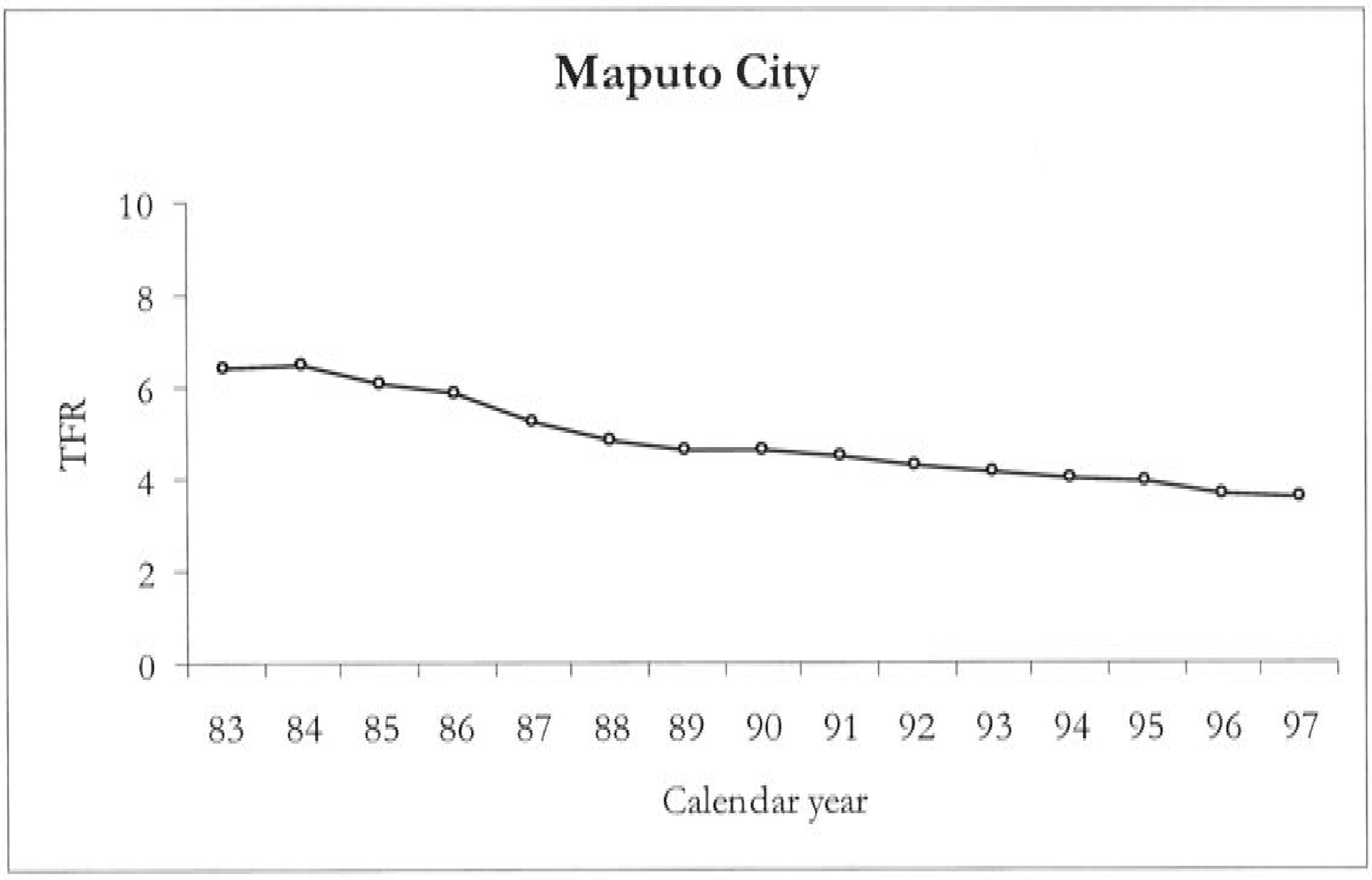

Manica
10
8
6
4
2
0
TFR
83 84 85 86 87 88 89 90 91 92 93 94 95 96 97
Calendar year


Sofala
10
8
6
4
2
0
TFR
83 84 85 86 87 88 89 90 91 92 93 94 95 96 97
Calendar year


Inhambane
10
8
6
4
2
0
TFR
83 84 85 86 87 88 89 90 91 92 93 94 95 96 97
Calendar year

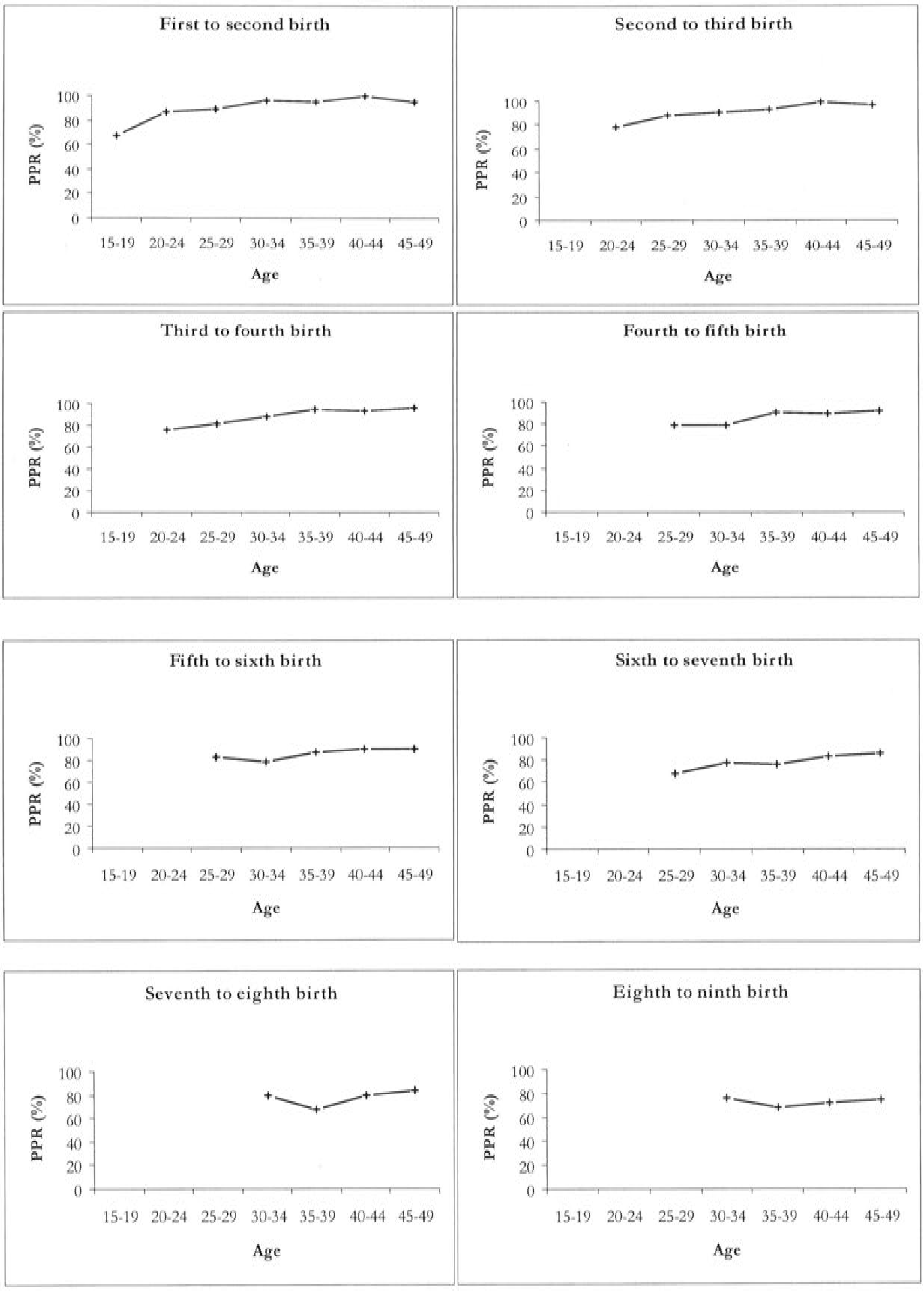

Gaza
10
8
6
4
2
0
TFR
83 84 85 86 87 88 89 90 91 92 93 94 95 96 97
Calendar year





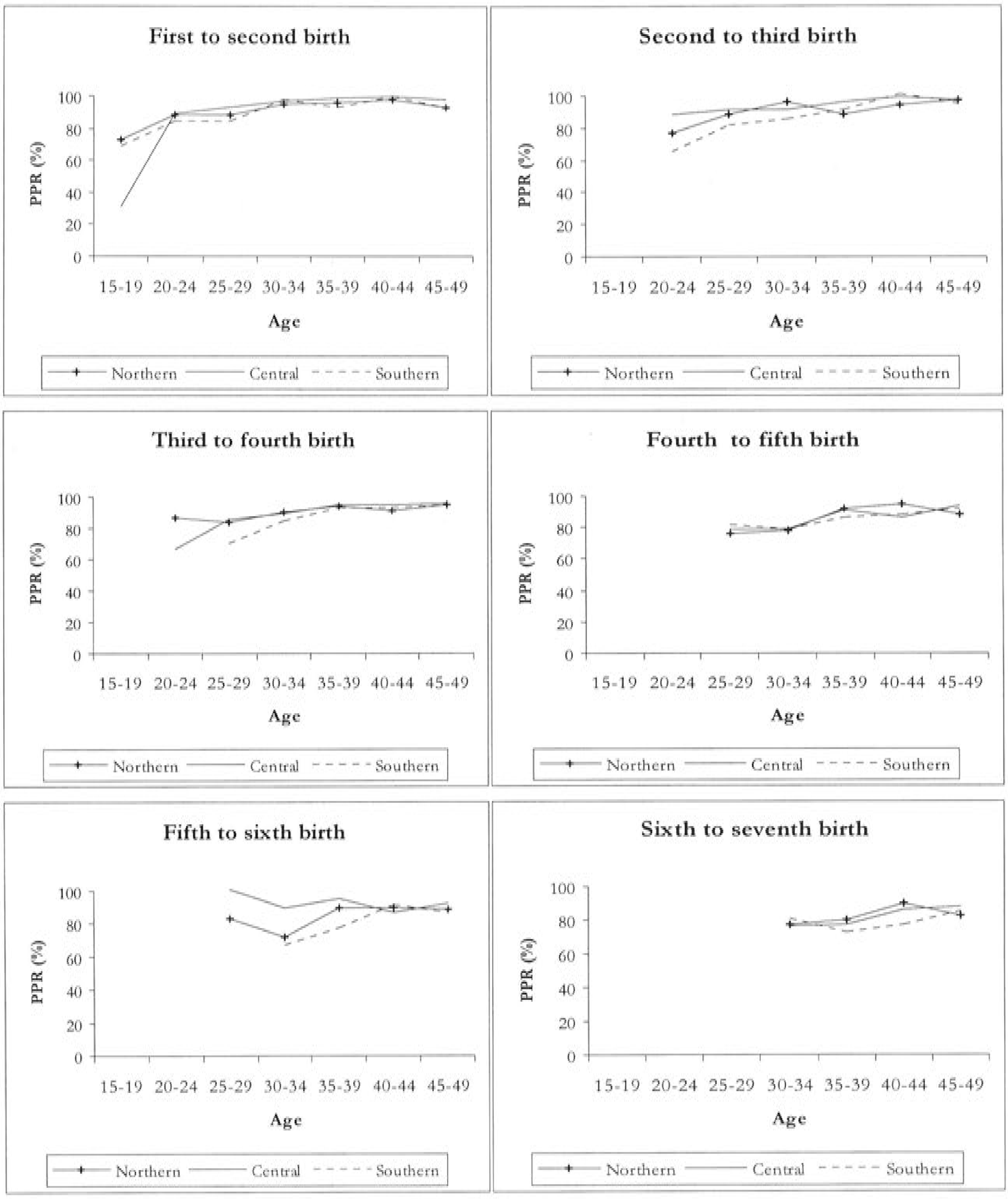
Source: Computed from 1997 Census.

Figure C3.4.1 Adjusted censored parity progression ratios by age, Mozambique 1997 DHS



Source: Table 3.12.

Figure C3.4.2 Adjusted censored parity progression ratios by age and region, Mozambique 1997 DHS



Source: Table 3.12.

D4.1 Tables for Chapter 4

Table D4.1 Selected socio-economic indicators by province, Mozambique

Province	TFR	SMAM	BREAST	CPR	ABSTN	INFERT	U5MR	LITER	GDLI	AGRIC	WMOD	URB	MBED	UWEIG	GDP	HDI	HPI	POLY	NORE
Niassa	6.7	15.8	26.0	4.3	10.8	6.4	253.6	15.8	392.1	94.9	1.4	23.0	10.4	38.0	120	0.23	61.6	23.2	2.9
Cabo Delgado	5.8	15.6	27.6	0.7	21.5	8.6	280.9	11.5	334.4	96.9	1.0	16.8	7.1	50.0	143	0.20	67.8	24.4	11.9
Nampula	6.4	15.5	27.1	2.0	18.5	11.3	279.0	14.1	354.6	96.6	1.3	25.0	7.7	29.0	166	0.20	63.6	22.0	17.4
Zambézia	6.7	17.3	24.9	4.7	3.9	7.6	306.2	14.8	361.6	97.3	0.9	13.5	6.7	33.0	126	0.17	65.3	15.8	20.5
Tete	7.1	18.1	29.1	8.4	10.5	5.8	214.4	19.0	476.2	95.4	1.5	14.7	10.8	41.0	158	0.29	62.1	25.7	46.9
Manica	6.5	18.1	24.2	5.2	12.9	6.6	216.4	26.1	539.0	90.0	2.6	28.2	11.1	34.0	184	0.34	57.5	50.4	55.1
Sofala	5.8	18.6	24.2	2.0	10.5	7.8	239.6	25.2	479.1	89.0	3.8	41.3	14.9	25.0	306	0.31	55.2	41.3	48.3
Inhambane	5.3	20.4	24.1	6.0	14.9	10.6	180.8	33.6	822.2	90.3	2.4	19.6	16.2	18.0	170	0.31	51.7	29.1	7.7
Gaza	5.4	20.6	24.4	1.8	16.1	7.0	188.4	37.0	945.0	92.9	2.8	24.7	16.4	16.0	147	0.30	49.1	35.4	37.6
Maputo Province	4.8	21.6	24.1	13.1	12.1	7.6	133.7	54.1	855.1	62.6	11.8	62.7	15.9	6.0	174	0.41	37.3	17.5	15.5
Maputo City	3.9	23	20.9	28.5	9.6	7.8	92.1	77.4	909.3	11.9	26.6	100.0	19.6	9.0	1340	0.61	21.1	15.8	17.1
Mozambique	6.1	18.1	24.5	5.1	12.5	8.4	245.6	26.0	587	90.0	3.5	29.0	11.0	26.1	237	0.29	56.8	28.0	25.0
Source	A	A	B	B	B	A	C	A	A	A	A	A	D	E	E	E	E	B	A

Note: TFR= Total fertility rate, 1997; SMAM= Singulate mean age at marriage; BREAST= Median duration of breastfeeding; CPR= Contraceptive prevalence rate; ABSTN= Median duration of postpartum abstinence; INFERT=% women aged 45-49 who are childless; U5MR= Under-five mortality rate; LITER= 1997 Adult female literacy rate (%); GDLI= Gender disparity in literacy index; AGRIC= % women 15-49 working in agriculture; WMOD= % women 15-49 working in modern sector; URB= % urban population; MBED= Number of maternity beds per 10 000 inhabitants; UWEIG= % children under 3 years old who are underweight; GDP= 1998 Gross domestic product per capita in US dollars; HDI= Human development index; HPI= Human poverty index; POLY= % of currently married women in polygynous unions; NOREL= % of population with no religion.

Source: A= Computed from 1997 Census
B= Computed from 1997 DHS
C= INE (1998c:Table 3.1)
D= INE (1999a)
E= Mozambique (1999).

Table D4.2 Poisson and negative binomial regression coefficients for the effect of socio-economic characteristics on lifetime fertility by place of residence, Mozambique 1997

Socio-economic characteristics	Standardised Beta (β) coefficients Urban	Rural
Education		
No education ®	0.000	0.000
Primary	-0.001	-0.009
Secondary or higher	-0.234 ***	-0.259
Employment status		
Not working ®	0.000	0.000
Unpaid worker/family worker	0.076	0.051 *
Self-employed/ informal sector	0.038	0.049 *
Paid worker/modern sector	-0.130 **	-0.062
Religion		
Catholic ®	0.000	0.000
Protestant	0.017	-0.006
Muslim	-0.019	0.002
Zionist	0.043	-0.026
Other religion	0.107	0.013
No religion	0.003	0.024
Household owns radio		
Yes ®	0.000	0.000
No	-0.034	-0.010
Age	0.176 ***	0.183 ***
Age square	-0.002 ***	-0.002 ***
Proportion children dead	0.118 **	0.366
Ethnicity		
Tsonga ®	0.000	0.000
Sena/Ndau	0.175 **	-0.039
Lomwe/Chuwabo	0.098	0.025
Macua	-0.033	0.039
Other local	0.057	-0.028
Portuguese/foreigner	-0.145 **	-0.139
Province		
Niassa®	0.000	0.000
Cabo Delgado	-0.144 *	-0.104 ***
Nampula	-0.125	-0.102 **
Zambézia	-0.198	-0.049
Tete	-0.268 **	0.030
Manica	-0.252 **	-0.002
Sofala	-0.305 ***	-0.082
Inhambane	-0.406 ***	-0.146
Gaza	-0.347 ***	-0.161 *
Maputo Province	-0.171	-0.068
Maputo City	-0.277 **	NA
Constant	-2.1 ***	-2.3 ***
Dispersion parameter (α)	0.000	0.038 ***
Chi-square	1732.0 ***	4563.1 ***
No. of cases	2171	8291

Notes: ® Reference category; *p≤0.05; **p≤0.01; ***p≤0.001. NA not applicable. Source: 1997Census.

Table D4.3 Odds ratios of having given birth in the year preceding the survey by socio-economic characteristics and age, Mozambique 1997 DHS

	Odds Ratios		
Socio-economic characteristics	All ages	15-29	30-49
Education			
No education ®	1.000	1.000	1.000
Primary	0.973	0.883	0.978
Secondary or higher	0.795	0.689	0.912
Employment status			
Not working ®	1.000	1.000	1.000
Unpaid worker/family worker	1.072	0.969	1.299
Self-employed/informal sector	1.133	1.143	1.023
Paid worker/modern sector	1.060	1.154	0.611
Religion			
Catholic ®	1.000	1.000	1.000
Protestant	1.061	1.131	0.887
Muslim	0.851	0.925	0.705
Zionist	1.052	1.186	0.784
Other religion	1.043	1.072	0.910
No religion	1.011	1.011	0.956
Marital status			
Never married ®	1.000	1.000	1.000
Married/in union	3.740 ***	3.476 ***	2.005 ***
Divorced/widow	1.493	0.571	1.193
Household owns radio			
Yes ®	1.000	1.000	1.000
No	1.002	1.063	0.839
Place of residence			
Urban ®	1.000	1.000	1.000
Rural	1.159	1.162	1.159
Age	0.955 ***	1.012	0.894 ***
Ethnicity			
Tsonga ®	1.000	1.000	1.000
Sena/Ndau	0.962	0.790	1.343
Lomwe/Chuwabo	1.189	1.471	0.830
Macua	0.701	0.683	0.699
Other local	1.043	1.152	0.845
Portuguese/Foreigner	0.914	0.865	1.329
Province			
Niassa	1.303	1.022	2.051
Cabo Delgado	1.169	0.938	1.584
Nampula	1.440	1.316	1.504
Zambézia	0.623	0.454 *	0.997
Tete	1.217	1.122	1.322
Manica	0.979	0.954	1.072
Sofala	1.006	1.034	0.959
Inhambane	0.731	0.721	0.770
Gaza	0.827	0.741	0.978
Maputo Province	1.003	0.904	1.242
Maputo City ®	1.000	1.000	1.000
Current contraceptive use			
No ®	1.000	1.000	1.000
Yes	0.546 ***	0.656 *	0.389 ***

Table D4.3 Continued…

Constant	-1.210 ***	-2.272 ***	1.746 **
-2 log likelihood	7460.2	4821.2	2498.8
Chi-square	495.9 ***	304.8 ***	235.0 ***
No. of cases	8144	4786	3358

Notes: ® Reference category; *p≤0.05; **p≤0.01; ***p≤0.001. Source: 1997DHS.

Table D4.4 Odds ratios of having given birth in the year preceding the census by socio-economic characteristics and place of residence, Mozambique 1997

Socio-economic characteristics	Odds Ratios	
	Urban	Rural
Education		
No education ®	1.000	1.000
Primary	1.083	1.126
Secondary or higher	0.968	0.584
Employment status		
Not working ®	1.000	1.000
Unpaid worker/family worker	1.559 *	1.089
Self-employed/informal sector	1.548 **	1.248 *
Paid worker/modern sector	0.945	0.925
Religion		
Catholic ®	1.000	1.000
Protestant	1.429	0.851
Muslim	1.230	0.874
Zionist	1.115	0.859
Other religion	1.625	1.090
No religion	1.278	1.070
Marital status		
Never married ®	1.000	1.000
Married	6.057 ***	4.568 ***
Divorced/ Widow	3.781 ***	2.927 ***
Household owns radio		
Yes ®	1.000	1.000
No	1.042	0.967
Age	0.963 ***	0.975 ***
Ethnicity		
Tsonga ®	1.000	1.000
Sena/Ndau	2.986 **	0.964
Lomwe/Chuwabo	1.186	1.401
Macua	1.213	1.365
Other local	1.863	1.052
Portuguese/foreigner	0.596	0.946
Province		
Niassa®	1.000	1.000
Cabo Delgado	0.803	0.612 ***
Nampula	1.224	0.698 **
Zambézia	1.135	0.677
Tete	0.431	0.876
Manica	0.781	0.825
Sofala	0.554	1.052
Inhambane	0.803	0.910

Table D4.4 Continued…

Province (Continued…)		
Gaza	1.224	0.729
Maputo Province	1.135	0.693
Maputo City	0.431	NA
Constant	-3.1 ***	-2.117 ***
-2 log likelihood	2133.4	9853.2
Chi-square	245.4 ***	410.5 ***
No. of cases	3257	10853

Notes: ® Reference category; *p≤0.05; **p≤0.01; ***p≤0.001. NA not applicable. Source: 1997Census.

E5.1 Tables and Graphs for Chapter 5

Table E5.1 Percentage of women never married by region and province, Mozambique 1980 and 1997

	1980				1997			
Region/Province	15-19	20-24	25-29	45-49	15-19	20-24	25-29	45-49
Northern	**34.4**	**6.1**	**3.6**	**3.1**	**36.3**	**10.3**	**7.2**	**8.0**
Niassa	34.7	5.8	3.1	3.0	36.8	11.3	7.6	7.6
Cabo Delgado	35.9	7.2	3.8	3.0	40.8	12.9	8.6	9.4
Nampula	33.5	5.7	3.6	3.1	34.2	9.0	6.5	7.5
Central	**43.8**	**7.3**	**3.2**	**1.8**	**52.0**	**13.5**	**6.7**	**4.0**
Zambézia	44.1	6.7	3.0	1.9	48.5	11.7	6.5	5.1
Tete	51.3	9.1	3.4	1.4	57.5	13.3	6.0	3.8
Manica	38.6	7.3	3.5	1.4	50.3	13.4	6.1	2.1
Sofala	40.1	7.4	3.6	1.9	56.0	18.2	8.3	3.4
Southern	**63.1**	**16.9**	**7.7**	**2.7**	**76.1**	**34.0**	**18.8**	**6.4**
Inhambane	61.3	14.2	6.3	2.3	69.4	27.2	14.8	5.6
Gaza	64.3	15.0	6.1	1.9	71.5	25.2	13.5	3.6
Maputo Province	57.8	14.1	7.3	2.6	79.3	36.6	20.7	8.7
Maputo City	67.3	23.8	11.7	5.6	85.2	48.7	26.6	10.2
Mozambique	**46.8**	**9.6**	**4.5**	**2.5**	**54.8**	**17.7**	**9.7**	**6.1**

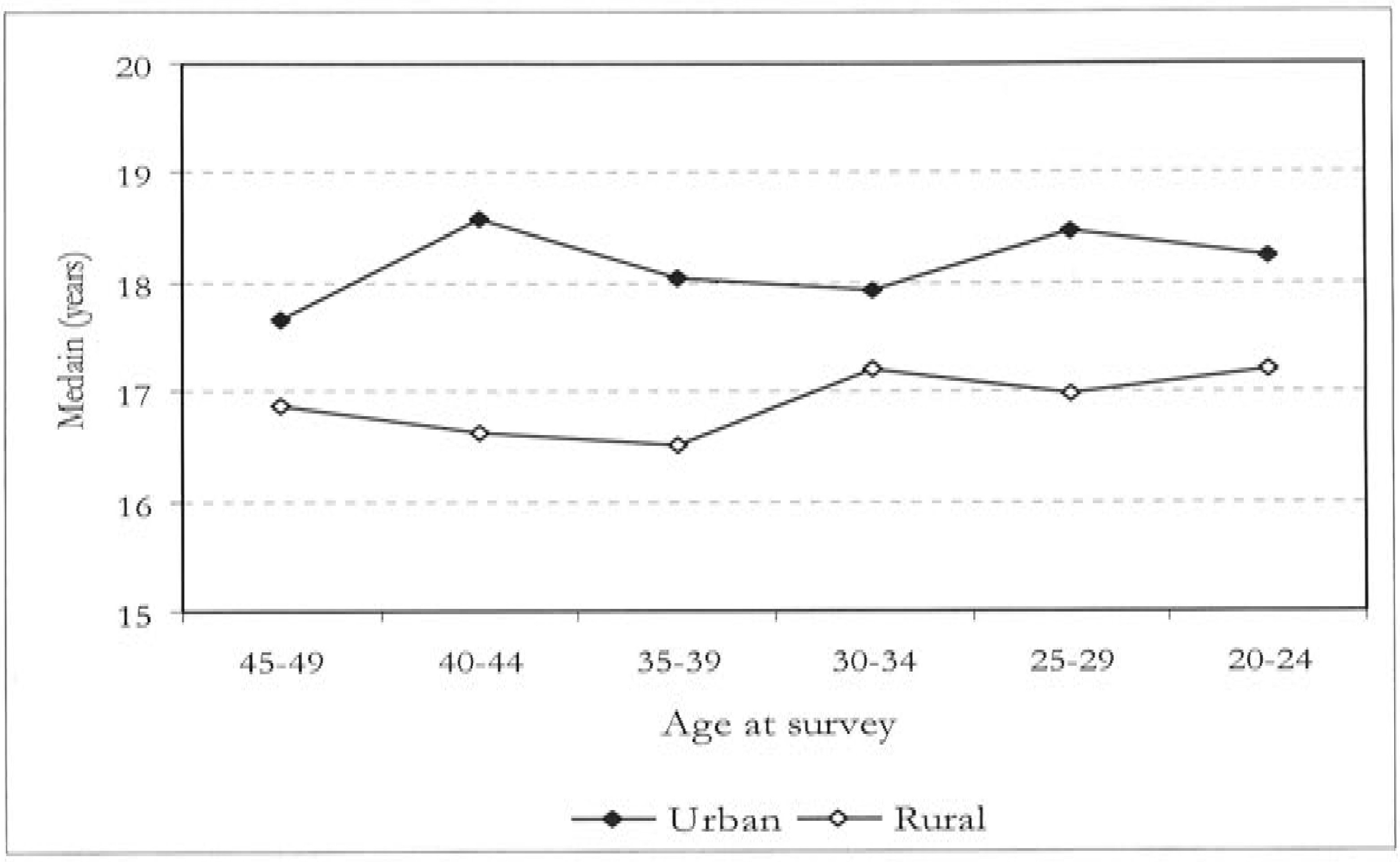
Source: Computed from 1980 and 1997 Censuses.

Table E5.2 Female SMAM by region and province, Mozambique 1980 and 1997

	SMAM		Absolute	%
Region/Province	1980	1997	change	change
Northern	**16.3**	**15.5**	**-0.7**	**-4.4**
Niassa	16.3	15.8	-0.5	-2.9
Cabo Delgado	16.4	15.6	-0.8	-4.7
Nampula	16.2	15.5	-0.7	-4.4
Central	**17.2**	**17.9**	**0.7**	**4.1**
Zambézia	17.1	17.3	0.2	0.9
Tete	17.8	18.1	0.3	1.7
Manica	16.8	18.1	1.3	8.0
Sofala	16.9	18.6	1.7	10.2
Southern	**19.2**	**21.4**	**2.2**	**11.7**
Inhambane	18.8	20.4	1.6	8.4
Gaza	19.1	20.6	1.5	7.6
Maputo Province	18.7	21.6	2.9	15.4
Maputo City	19.8	23.0	3.2	16.0
Mozambique	**17.5**	**18.1**	**0.7**	**3.8**

Source: Computed from 1980 and 1997 Censuses.

Figure E5.1 Median age at first marriage by cohort and place of residence, Mozambique 1997 DHS



Source: Computed from 1997 DHS.

F7.1 Table for Chapter 7

Table F7.1 Secondary infertility by age and socio-economic characteristics, Mozambique 1997

Socio-economic Characteristics	Age 20-24	25-29	30-34	35-39	40-44	20-44	Sample size
Region							
Northern	11.0	21.0	31.7	42.5	70.5	25.1	1467
Central	7.2	13.1	17.8	39.3	49.7	15.9	1901
Southern	7.7	10.2	23.9	40.6	59.2	21.8	1511
Education							
No education	9.9	19.9	22.6	43.7	58.6	23.2	2505
Primary	9.6	12.4	25.4	44.5	56.5	17.8	2221
Secondary or higher	6.7	10.5	17.3	27.4	67.6	11.8	154
Place of residence							
Urban	9.1	13.7	22.6	36.6	53.5	18.5	1044
Rural	8.9	16.8	23.0	43.3	63.6	22.6	3835
Religion							
Catholic	6.3	18.1	28.4	45.3	51.6	20.2	1434
Protestant	7.5	8.6	24.5	29.6	59.5	17.5	630
Muslim	11.5	21.1	30.3	46.7	71.2	24.6	862
Zionist	8.6	15.2	19.3	39.9	61.2	22.1	433
Other religion	8.2	5.4	10.3	27.4	40.4	12.1	309
No religion	6.8	11.4	13.4	40.9	47.8	17.0	1074
Ethnicity							
Tsonga	7.7	11.0	22.5	39.7	60.0	21.7	1426
Sena/Ndau	3.6	9.9	15.4	34.4	44.7	14.2	1168
Lomwe/Chuwabo	10.1	18.4	20.6	37.8	43.1	19.2	413
Macua	12.0	21.5	35.6	43.2	68.3	25.6	1472
Other local	9.3	23.1	27.0	46.6	53.4	21.6	229
Portuguese	3.5	3.5	29.9	42.2	57.8	12.3	106
Mozambique	8.6	16.0	24.5	42.8	62.7	21.3	4879

Source: Computed from 1997 DHS.

G8.1 Tables for Chapter 8

Table G8.1 Odds ratios from multinomial logistic regression analysis of ever-use of contraception by socio-economic characteristics among currently married women 15-49, Mozambique 1997

Socio-economic characteristics	Odds ratios		
	Model I	Model II	Model III
	Traditional vs no method	Modern vs no method	Modern vs traditional
Woman's education			
No education	1.000	1.000	1.000
Primary	0.793	1.961 ***	2.472 **
Secondary or higher	1.169	4.371 ***	3.739 *
Husband's education			
No education	1.000	1.000	1.000
Primary	0.758	1.061	1.400
Secondary or higher	1.404	1.705 *	1.215
Employment status			
Not working ®	1.000	1.000	1.000
Unpaid worker	0.110 ***	0.633 *	5.736 **
Self-employed	0.663	0.723 *	1.091
Paid worker	0.893	1.506	1.687
Religion			
Catholic ®	1.000	1.000	1.000
Protestant	1.005	1.081	1.075
Muslim	0.944	0.956	1.012
Zionist	0.627	0.658 *	1.048
Other religion	0.549	0.578 *	1.053
No religion	0.706	0.547 **	0.775
Ethnicity			
Tsonga ®	1.000	1.000	1.000
Sena/Ndau	0.883	1.220	1.383
Lomwe/Chuwabo	0.283	0.895	3.157
Macua	0.550	1.162	2.114
Other local	0.230	1.869	8.118 *
Portuguese/foreigner	0.835	1.936 *	2.319
Place of residence			
Urban ®	1.000	1.000	1.000
Rural	0.646	0.438 ***	0.677
Age	0.999	1.017	1.017
Household owns radio?			
Yes®	1.000	1.000	1.000
No	1.122	0.730 **	0.650

Table G8.1 Continued...

Socio-economic characteristics	Odds ratios		
	Model I	Model II	Model III
	Traditional vs no method	Modern vs no method	Modern vs traditional
Exposure FP from media			
Exposed to none ®	1.000	1.000	1.000
Exposed to one medium	1.228	1.181	0.962
Exposed to two media	1.005	1.025	1.021
Exposed to all three media	1.218	1.174	0.964
Marital status			
Never married			
Monogamous®	1.000	1.000	1.000
Polygynous senior	1.286	1.013	0.788
Polygynous junior	1.257	0.889	0.707
Divorced/widow			
Fertility preference			
Have another ®	1.000	1.000	1.000
Undecided	2.604 *	1.363	0.523
No more	1.627	1.490 **	0.915
Sterilised/infecund	2.162	2.186 ***	1.011
Number of surviving children			
None ®	1.000	1.000	1.000
1-2	4.719 *	2.340 **	0.496
3-4	7.017 *	5.609 ***	0.799
5 +	10.976 **	5.313 ***	0.484
Discussed FP with partner			
Never ®	1.000	1.000	1.000
Once or twice	2.871 ***	3.252 ***	1.133
More often	2.776 **	5.711 ***	2.057
Husband approval of FP			
Disapproves ®	1.000	1.000	1.000
Approves	1.491	2.208 ***	1.480
Don't know	1.047	0.832	0.795
Respondent approval of FP			
Disapproves ®	1.000	1.000	1.000
Approves	5.000 ***	6.080 ***	1.216
Don't know	1.406	1.990 **	1.415
Region			
Northern	4.779	0.385 **	0.081 **
Central	1.596	0.451 *	0.282
Southern®	1.000	1.000	1.000
Constant	-6.80 ***	-4.94 ***	1.86
- 2 Log likelihood		3083.06	
Chi-square		2323.44***	
No. of cases		4892	

Note: ® Reference category; *p≤0.05; **p≤0.01; ***p≤0.001. Source: Computed from 1997 DHS.

Table G8.2 Odds ratios from multinomial logistic regression analysis of current-use of contraception by socio-economic characteristics among currently married women 15-49, Mozambique 1997

Socio-economic characteristics	Odds ratios		
	Model I Traditional vs no method	Model II Modern vs no method	Model III Modern vs traditional
Woman's education			
No education	1.000	1.000	1.000
Primary	0.702	1.908 **	2.716 *
Secondary or higher	2.077	2.418 **	1.164
Husband's education			
No education	1.000	1.000	1.000
Primary	0.996	1.559	1.566
Secondary or higher	0.627	2.103 *	3.355
Employment status			
Not working ®	1.000	1.000	1.000
Unpaid worker	0.667	0.652	0.977
Self-employed	1.647	0.789	0.479
Paid worker	3.126 *	1.027	0.328
Religion			
Catholic ®	1.000	1.000	1.000
Protestant	0.555	1.144	2.061
Muslim	1.022	1.235	1.209
Zionist	0.369	0.811	2.196
Other religion	0.557	0.654	1.174
No religion	0.438	0.607	1.386
Ethnicity			
Tsonga ®	1.000	1.000	1.000
Sena/Ndau	0.359	1.617	4.510 *
Lomwe/Chuwabo	0.000	1.328	0.000
Macua	0.271	1.205	4.445
Other local	0.110	1.636	14.806 *
Portuguese & foreigner	1.062	1.204	1.135
Place of residence			
Urban ®	1.000	1.000	1.000
Rural	0.574	0.489 ***	0.852
Age	1.004	1.039 **	1.035
Household owns radio?			
Yes®	1.000	1.000	1.000
No	0.932	0.995	1.067
Exposure FP from media			
Exposed to none ®	1.000	1.000	1.000
Exposed to one medium	0.576	1.865 ***	3.237 **
Exposed to two media	0.774	1.317	1.700
Exposed to all three media	0.288	1.104	3.831

Table G8.2 Continued…

Socio-economic characteristics	Odds ratios		
	Model I	Model II	Model III
	Traditional vs no method	Modern vs no method	Modern vs traditional
Marital status			
Monogamous®	1.000	1.000	1.000
Polygynous senior	1.433	0.692	0.483
Polygynous junior	1.041	0.786	0.755
Fertility preference			
Have another ®	1.000	1.000	1.000
Undecided	1.188	1.290	1.086
No more	1.261	1.675 **	1.328
Sterilised/infecund	0.289	7.778 ***	26.905 **
Number of surviving children			
None ®	1.000	1.000	1.000
1-2	3.334	12.326 ***	3.697
3-4	5.940	15.886 ***	2.674
5 +	5.987	15.377 ***	2.569
Discussed FP with partner			
Never ®	1.000	1.000	1.000
Once or twice	3.889 **	3.988 ***	1.026
More often	4.594 **	5.966 ***	1.299
Husband approval of FP			
Disapproves ®	1.000	1.000	1.000
Approves	3.779 *	2.802 ***	0.741
Don't know	3.158	1.452	0.460
Respondent approval of FP			
Disapproves ®	1.000	1.000	1.000
Approves	20.128 **	8.445 ***	0.420
Don't know	0.000	3.320 **	0.000
Region			
Northern	4.815 *	0.414 *	0.086 **
Central	1.911	0.435 *	0.228 *
Southern®	1.000	1.000	1.000
Constant	-9.32	-9.98 ***	-0.66
- 2 Log likelihood		1942.40	
Chi-square		1336.71***	
No. of cases		4892	

Note: ® Reference category; *p≤0.05; **p≤0.01; ***p≤0.001.
Source: Computed from 1997 DHS.